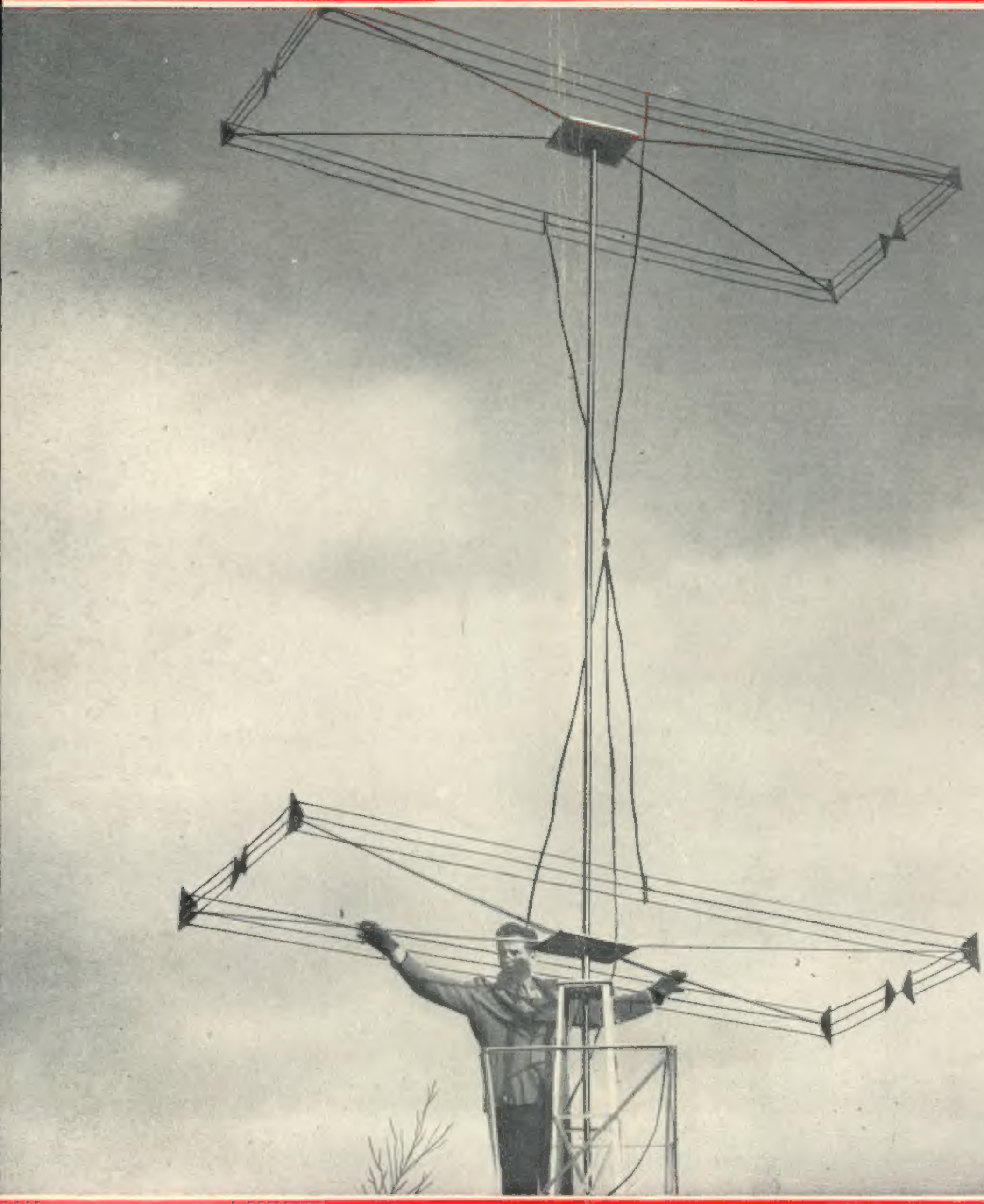
CQ

FEBRUARY, 1947

The Radio Amateurs' Journal

25¢



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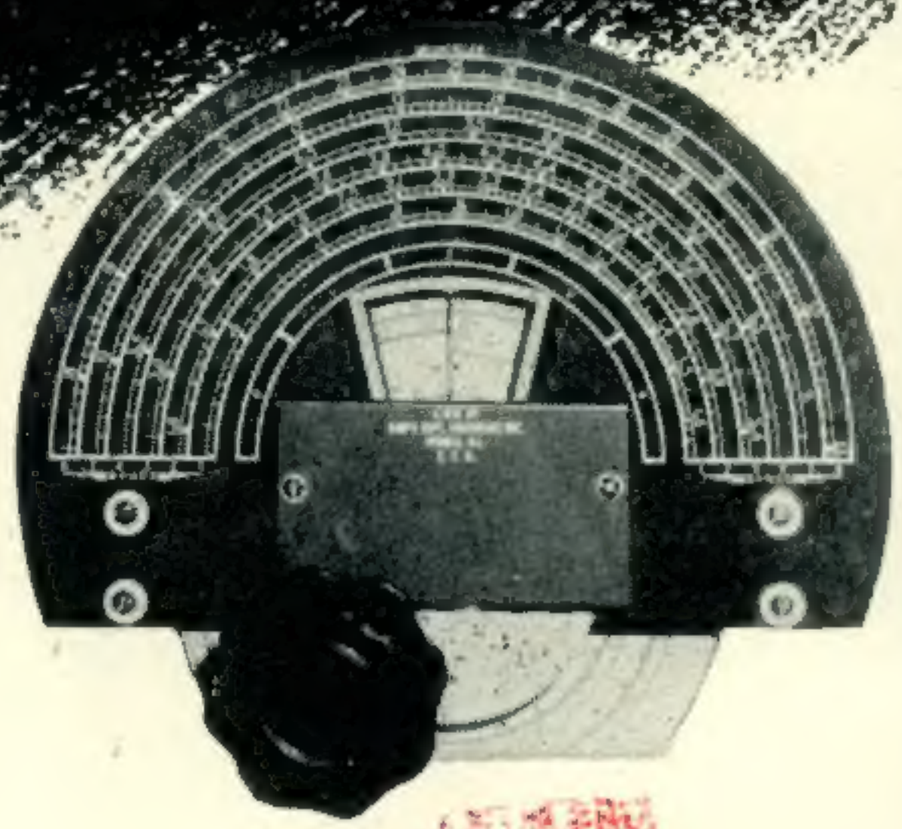

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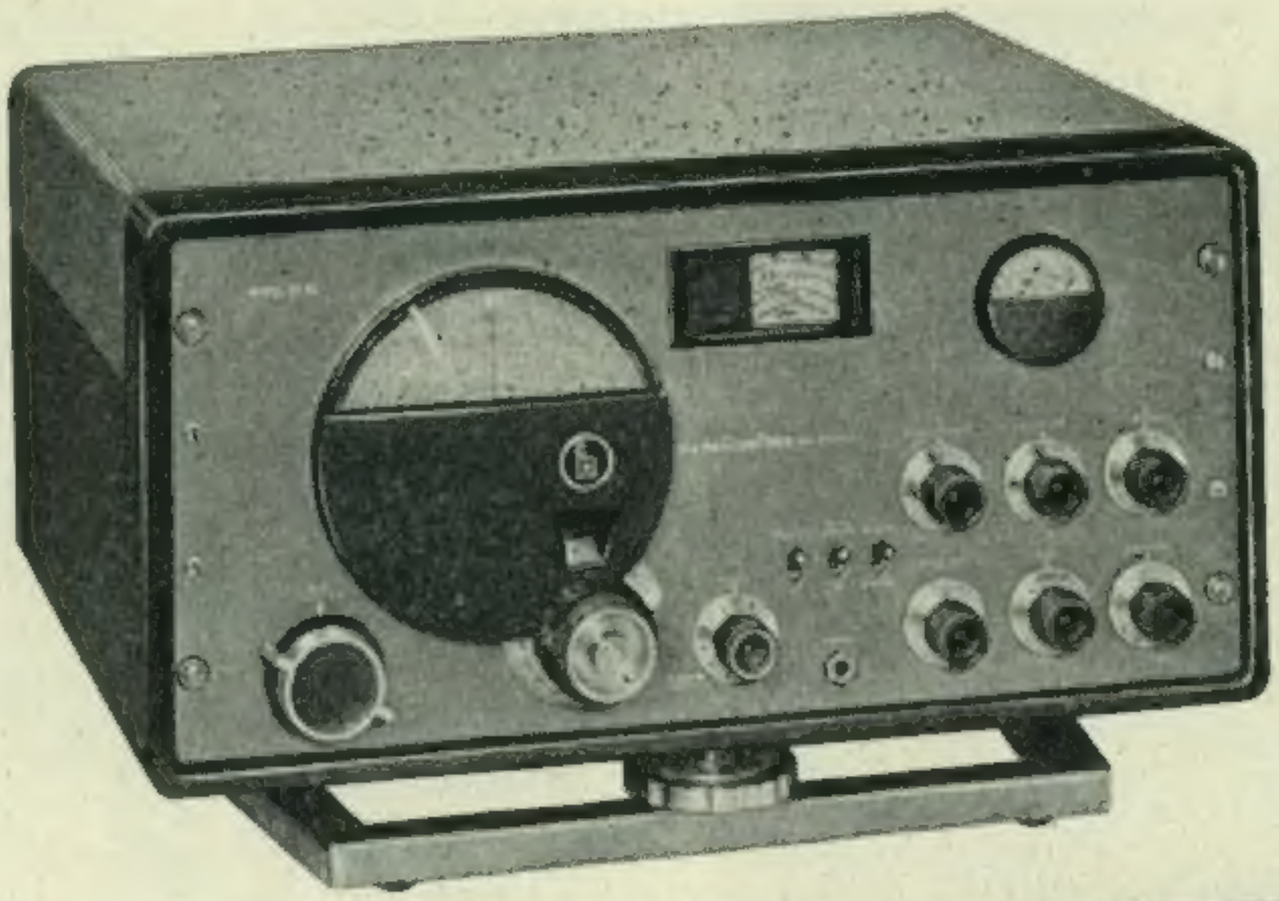

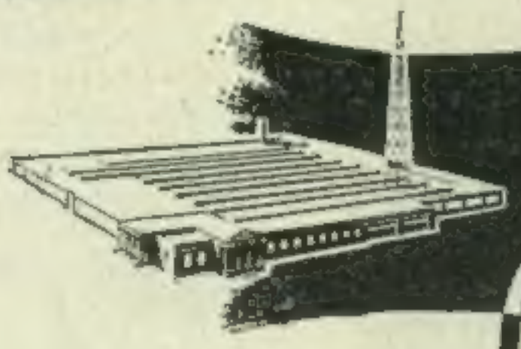

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The Radio Amateur's Journal

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EDITORIAL STAFF

JOHN H. POTTS, Editor

Managing Editor

LAWRENCE LeKASHMAN, W2IOP

•

Assistant Editors

HERB BECKER, W6QD, OLIVER P. FERRELL, FRANK C. JONES, W6AJF

•

Contributing Editors

AMELIA BLACK, W2OLB, ROBERT Y. CHAPMAN, W1QV, ELMER H. CONKLIN, W3JUX, VINCENT G. DAWSON, WØZJB, HENRY J. GEIST, W3AOH JAMES J. HILL, W2JIH

•

EVELYN MILLARD, Editorial Production Mgr.

BUSINESS STAFF

J H. Potts, President; S. R. Cowan, Publisher; S L. Cahn, Advertising Sales Manager; H. N. Reizes, Advertising Manager; D. Saltman, Production Manager; D Reissman, Circulation Manager.

Branch Offices: Chicago—H. S. Laufman, 82 W. Washington St., Chicago 2, Ill., ANDover 1395. Los Angeles—J. C. Galloway, 816 W. 5th St., Los Angeles 13, Cal., MUtual 8335.

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Vol. 3. FEBRUARY, 1947 No. 2

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W8LO putting the finishing touches to his latest brainchild—two double triplex beam sections stacked ⅜ths wavelength apart and fed in phase. The ends are folded 1/16th wavelength in order to make the entire arrangement more compact and to permit the use of a dural supporting "X" of dimensions well under ½ wavelength. On-the-air checks showed a tremendous improvement over a single section triplex. Construction details were given in last month's article by W8LO.

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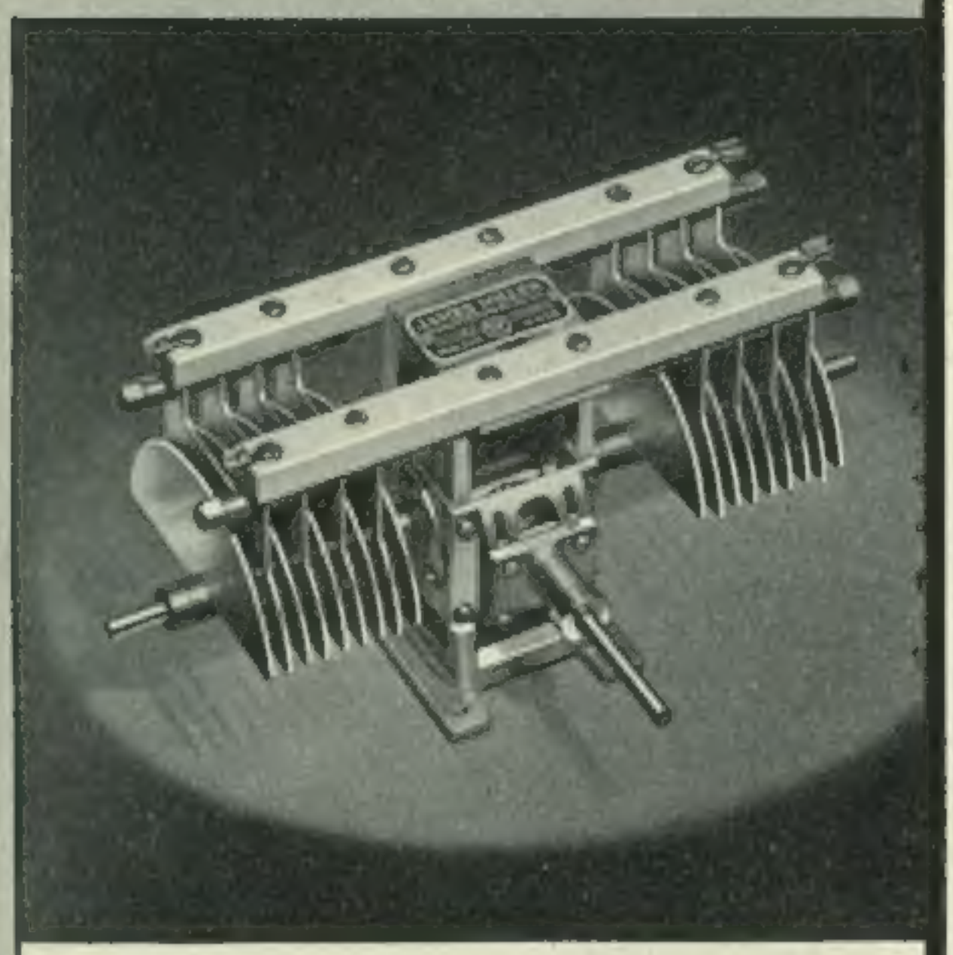
Designed for

Application



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• • Letters • • •

Frequency Congestion

70 Hoffman Ave., Napa, Calif.

Editor, *CQ:*

. . . How many stations will (the amateurs) be able to pull through the increasing bedlam of local QRM? Any antenna system has a certain amount of power that has the net result of causing local interference. I frankly believe if the amateur will get this high power bug out of his mind, settle down to lower power of 100-150 watts and put it where it belongs, everyone will get a better chance.

I am speaking from my 20 odd years of amateur radio experience, having started with a de-coherer and a mush box for a tuner, progressing to rigs with a kilowatt, finally ending up with 150 watts. I now use this and do as well as the big rigs, by putting the juice in the antenna where it belongs . . .

J. Wayne Clark, W6CAN

Power restrictions are frequently discussed as a means of alleviating amateur band congestion. But the law is very specific on this point, calling for the minimum power for given communications. Greater attention to this point, would be, in our opinion more desirable than restrictions on maximum power input.—Ed.

Illegal Radio Operations

F.C.C. Field Engineering & Monitoring Division,
641 Washington St., N. Y. 14, N. Y.

Editor, *CQ:*

In the latter part of January, 1946, our long range adcock direction finders notified our central office in Washington, D. C. that they had observed a radio station operating c.w. on 14,055 kc, signing call letters W2XX. 14,055 kc, as you know, is in the 20 meter band and at that time the band was closed to amateurs, part of the band being allocated to the Military Service. These long range direction finders operate on a sky wave principle and are operated by our primary monitoring stations located at Allegan, Michigan; Grand Island, Nebraska; Kingsville, Texas; Laurel, Maryland; Portland, Oregon; Powder Springs, Georgia; San Leandro, California; Santa Ana, California; and Scituate, Rhode Island. In addition, adcock direction finders are also operated by our secondary monitoring stations located at Searsport, Maine; Scituate, Rhode Island; South Miami, Florida; Lexington, Kentucky; New Orleans, Louisiana; and Spokane, Washington.

As can be seen, these long range direction finders are strategically located throughout the United States, so that a "fix" may be obtained on any unidentified station anywhere in this country The particular fix, as obtained on the station signing W2XX, indicated that the station was located in, or slightly northwest of, New York City. Mobile units attached to this office, which are ordinary sedans equipped with direction finding equipment, two-way radio, and necessary receivers, were immediately dispatched to the point of the approximate fix. The mobile unit direction finding equipment differs from that of the long range direction finders in that the mobile unit direction finding equipment works on the ground wave principle. By utilizing either of these two p inciples of direction finding, namely; sky wave and ground wave, it is possible to locate a station whether the signal characteristic indicates a ground wave or sky wave. The station signing W2XX did not operate regularly and all transmissions were of very short duration. The short duration of each transmission was for the purpose of escaping detection and defeating direction finding methods. It was, therefore, necessary to have the mobile units standing by in the area of the approximate fix.

Prior to February 24, 1946, approximate bearings were obtained on the station signing W2XX. To further complicate matters, it was definitely established that there were at least two, and possibly more, stations using the call letters W2XX and operating on the same frequency. At first, it appeared that there may have been a radio station on a small boat cruising around Manhattan and New Jersey, since the bearings on one occasion would indicate that the station was in or near Bayonne, New Jersey and on other occasions the bearings would indicate that the station was in Brooklyn or Queens.

On February 24, 1946, it was definitely established that one of the stations operating illegally was located on West Grand Street, Elizabeth, New Jersey. A mobile unit was parked near this area to assist other mobile units in synchronizing the bearings, so that a fix could be obtained on the second station signing W2XX.

On March 2, 1946, one mobile unit was parked just South of Fort Lee, New Jersey and another mobile unit was parked at Riverdale, New York. The mobile units were placed in these positions since it had not been definitely determined that the second station signing W2XX was fixed, and it might very probably be mobile. At 7:10 p.m., the second station signing W2XX was observed working in the 20 meter band and a bearing was taken by the mobile units. During all this time, the long range direction finders were also monitoring for this station and they would alert the mobile units whenever this station came on the air. The bearings obtained by these two mo-

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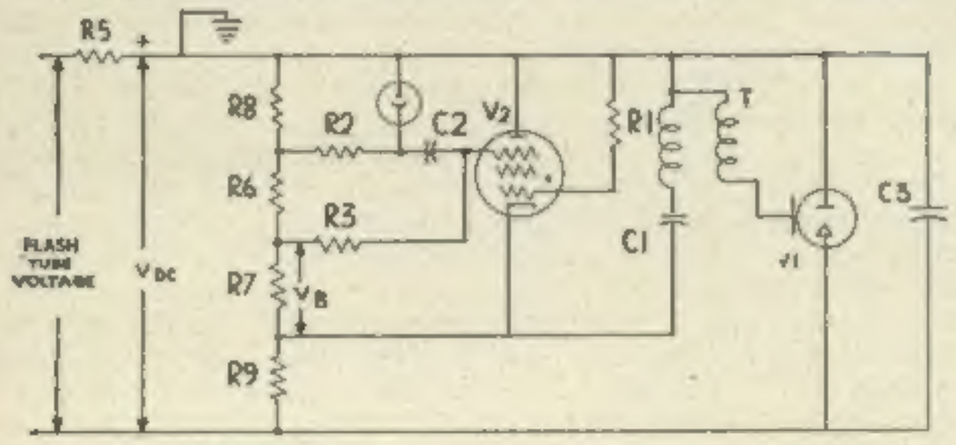

R_1	Keep-alive current limiting resistor	20 megohms
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R_6, R_7, R_8, R_9	Phototube and Triggertube voltage divider	
C_1	Anode discharge condenser	0.25 μfd.
C_2	Trigger grid condenser	0.01 μfd.
C_3	Flash tube condenser	
T	Ignition coil condenser	
V_B	Trigger grid bias voltage	
V_1	Flash tube type R4330	
V_2	Type OA5 Triggertube	

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bile units indicated that the station was operating slightly north of the Ridgewood Section of Queens, Long Island. At 7:30 p.m., the station went off the air. Continuous monitoring was conducted near this area and at 2:30 p.m. on March 4, 1946, the second station was heard making a very short transmission. The field intensity of the second station indicated that the mobile units were in very close proximity to the actual location. At 7:00 p.m., on this same date, the station was again heard and field intensity runs were made. Field intensity readings were taken at the same time. By field intensity readings is meant an instrument that indicates a greater field intensity as the source of signal is approached. Between 7:30 p.m. and 8:00 p.m., the second station signing W2XX was heard working and field intensity runs continued, although the duration of the transmissions were very brief. At 8:30 p.m., it was definitely established that the source of signal was emanating from a residential building, located near the intersection of Fresh Pond Road and 71st Avenue, Queens, Long Island.

On March 5, 1946, an entry was made into this building, an apartment house, to determine who was operating this radio station. Upon entering the apartment, after proper identification had been made, the operator denied that he had been operating on approximately 14,055 kc. He also denied ownership of a type 59 e.c.o. self-constructed transmitter, using a 6L6 as a doubler and an 807 in the final amplifier. When confronted with some of the copies of his previous transmissions, the operator finally admitted that he had been transmitting in the 20 meter band. To further substantiate the fact that he had just gone off the air, the tubes in the transmitter were extremely warm. The operator was placed under arrest and booked at the 104th Precinct Police Station and the transmitting and associated equipment was taken into custody for evidence.

On March 6, 1946, the operator was taken before an Assistant United States Attorney in the United States District Court, Eastern District of New York. After hearing the particulars of this case, the operator was taken before the United States Commissioner, who set bail at $500.00.

On August 29, 1946, the facts of this case were presented to the Grand Jury and the defendant was indicted, and a True Bill of Particulars was handed up by the Grand Jury.

The operator was brought to trial on September 9, 1946 before a United States Court Judge. At this time the defendant informed the Court that he was without counsel and the Court appointed a counsel to represent the defendant. The case was adjourned until September 16, 1946.

On September 16, 1946, a Court heard the particulars of this case and adjourned the case until September 20, 1946.

On September 20, 1946, the defendant pleaded guilty to Count No. 3 of the indictment, violation of Section 303 of the Communications Act of 1934, as amended, (has transmitted a call signal or letter which has not been assigned by a proper authority to the station which he is operating). The Court sentenced the defendant to three months confinement, which was suspended, a $50.00 fine and eighteen months probation.

The following is another instance of locating and apprehending an unlicensed station:

On July 5, 1946, one of our mobile units was performing routine monitoring near Eagle Rock, West Orange, New Jersey. The monitors intercepted an amateur call, W2ANA, operating "fone" on 144.8 mc, which is the 2 meter band, with a very strong signal strength. It is the policy of our monitors that when a call is heard that the call be checked against the call records which are available in the mobile units. In checking the records, it was found that this call letter was issued to an amateur in Rocky Point, Long Island and that the license had expired and was void. In view of the strong signal strength at Eagle Rock and the distance between Eagle Rock, New Jersey and Rocky Point, Long Island, a bearing was taken on this station. The station was first heard at 7:55 p.m. and the bearing indicated that the station was in Newark, N. J. At 9:35 p.m., the station was located on Burnet Street, Newark, N. J. A friendly entry was made into the buildings in search of the transmitter. The transmitter was finally located in an apartment house. The person operating the transmitter was asked to produce a valid amateur station license and operator's license. The person operating the transmitter was not in possession of either license. A check of our records revealed that the person operating the transmitter had never applied for, or held, any type of license. It was also determined that the operator was not capable of copying thirteen words per minute, as required to become a legitimate amateur.

On July 16, 1946, the operator of this station was taken before the United States Commissioner in the District Court of New Jersey, Jersey City, N. J. After reviewing the facts concerning the violation of Sections 301, 303 and 318 of the Communications Act of 1934, as amended, the United States Commissioner released the operator on $500.00 bail. The defendant pleaded guilty and waived indictment.

On September 20, 1946, the defendant was called before the United States District Court Judge, Federal Building, Newark, N. J., was sentenced to one year's probation and fined $250.00.

In the first case outlined, the person operating this station is a licensed amateur and in the second case, although the person was operating in the amateur band and using amateur procedures, he was not considered an amateur since he held neither station nor operator's license.

[Continued on page 70]

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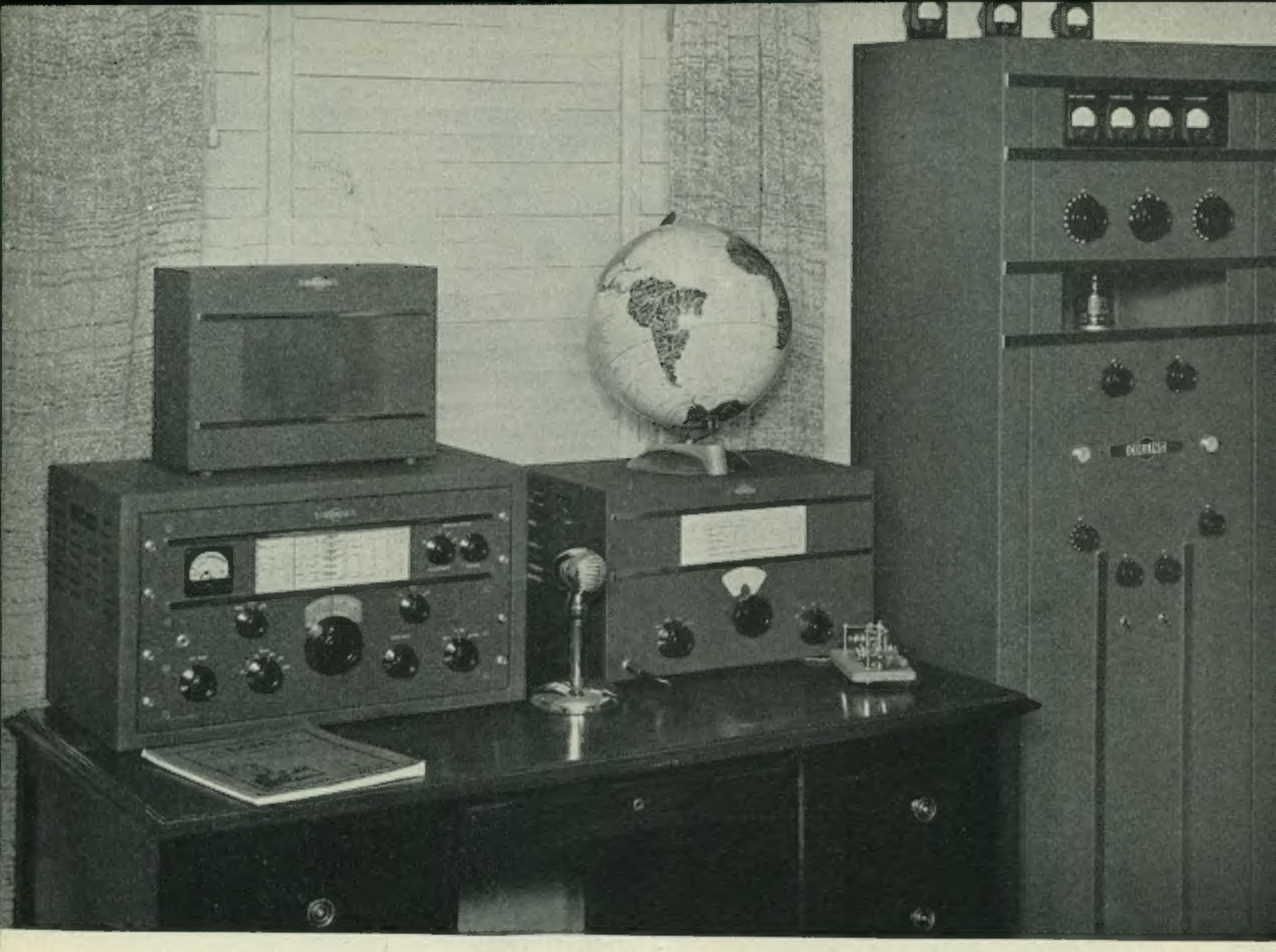

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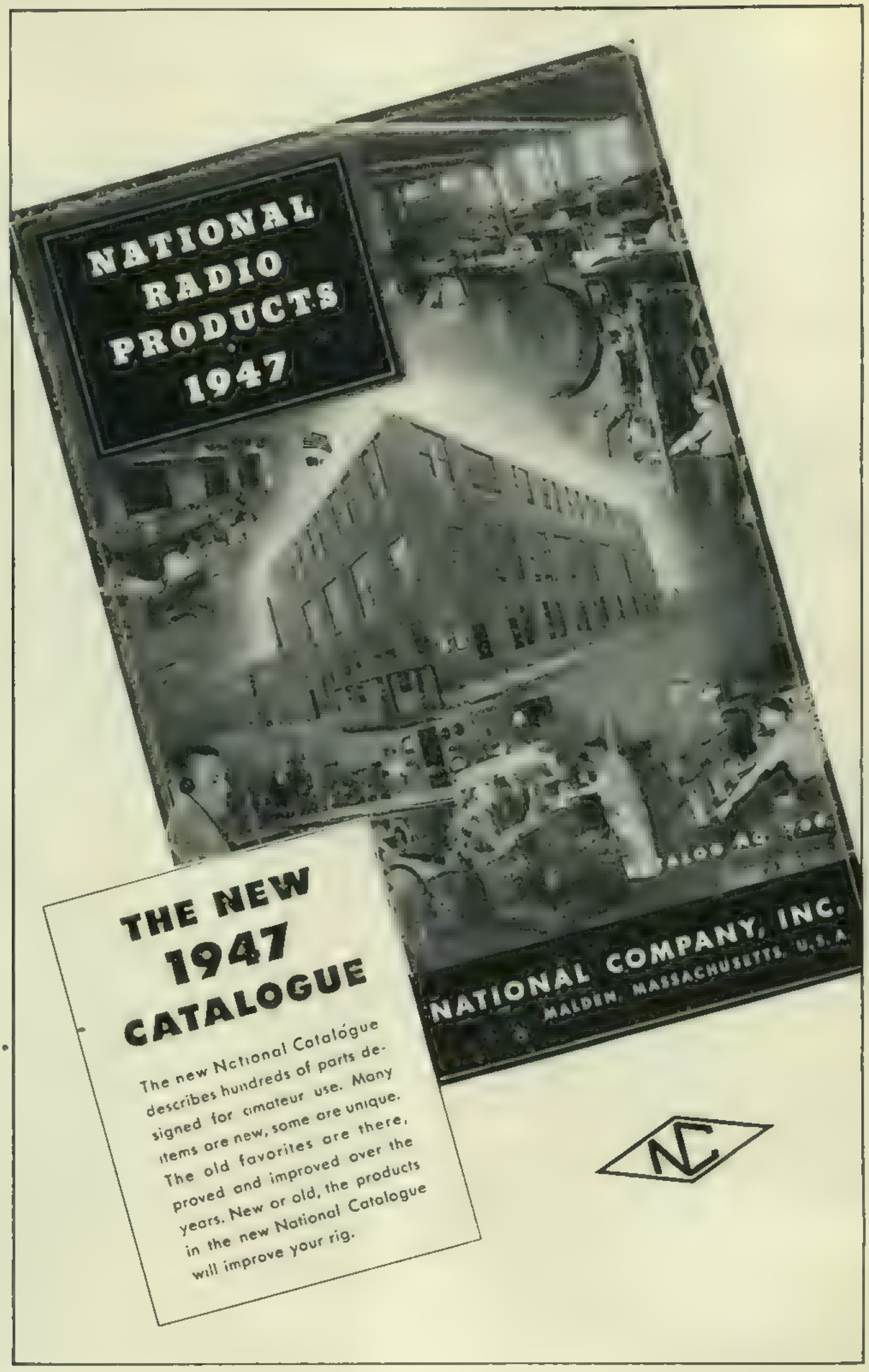
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The Moscow Conference

From September 30th to October 21st, representatives of China, France, the U.S.S.R., United Kingdom, and the U. S. A. met in a series of sessions known as the Moscow Five-Power Telecommunications Conference. The purpose of this meeting was to discuss, in advance of the world telecommunications conference, the ideas of these major powers concerning frequency allocations. Nothing discussed at this conference is binding on any party, but results of the talks provide a graphic picture of what amateurs can anticipate at the 1947 world telecommunications conference. The picture? A terrific fight for our existing bands!

Briefly, the proposals for the principal DX amateur bands look like this:

1.7 mc: No U.S. or French amateur assignment proposed. U.K. and U.S.S.R. propose amateur occupancy on a shared basis with other services.

3.5 mc: U. S. proposes 3500-4000 kc exclusively for amateurs. U.S.S.R. proposes elimination of amateurs entirely. U.K. proposes cutting the band to 400 kc on a shared basis. France proposes cutting the band to 250 kc on a shared basis.

7 mc: U. S. proposes 7000-7300 exclusively for amateurs. U.K. proposes half the band exclusively for amateurs and the other half to be shared by amateurs and international broadcast. U.S.S.R. proposes 7000-7200 on a shared basis with other services. France proposes an exclusive amateur band, but only 150 kc wide.

14 mc: U. S. and French proposal in agreement for exclusive amateur band 14000 to 14400 kc. U.S.S.R. proposes same band, but on a shared basis with fixed services. U.K. wants 14350 to 14400 kc to be shared between amateurs and international broadcasting.

28 mc: U.S. proposal is 28000-29700 kc, a band that was generally acceptable to all other participating powers.

The new 21-mc band being proposed by the U.S. for the first time, was surprisingly well received, with only the U.K. making no provision at all for amateurs in this part of the spectrum.

It should be realized that these were only the initial proposals, that 80 for example, is a regional band and was not exclusively amateur in Europe prior to the war. The sum and substance of initial discussions show a fairly wide gap between proposals by the participants. It would seem that the biggest contenders for amateur frequencies are propaganda broadcast stations. This fact, as pointed out by the ARRL report, is rather incongruous in view of our recent military victories.

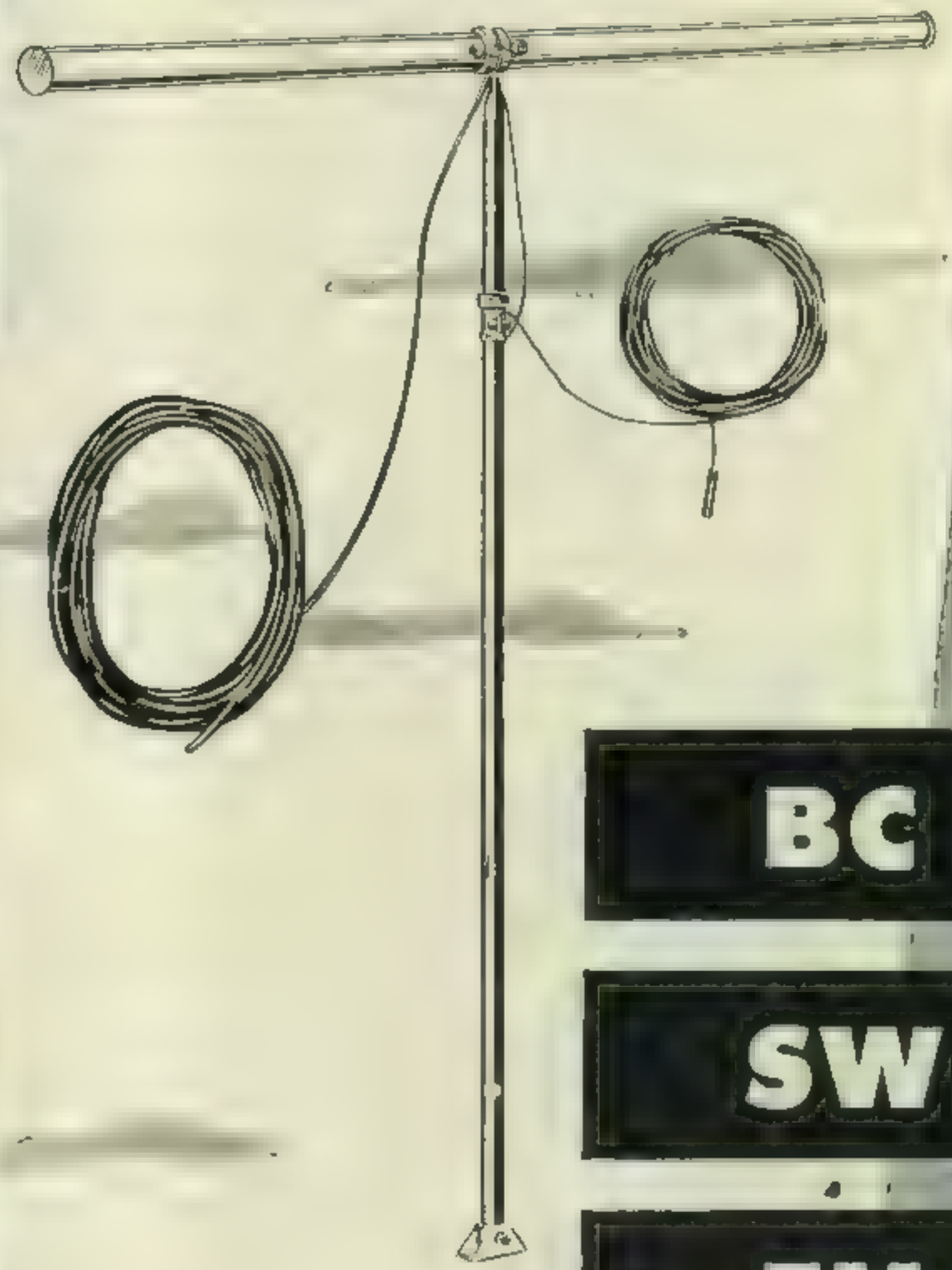
However, it is not the purpose of this editorial to discuss the Moscow conference as such, but rather to discuss the conference in light of future moves on the part of the average amateur. Many amateurs are little concerned with the so-called "political" aspects of amateur radio. Their indifference is not unlike the apathy of millions of American voters who literally throw away their franchise year after year by failing to interest themselves in the elections. Through the medium of the amateur press, such as CQ, and the ARRL, hams have had the opportunity to air their differences in opinion and come to a majority agreement. Hams who gripe—whether it be about a Q signal or a proposed frequency change—are doing no one any good unless they make their views known to the proper people.

The decks are cleared for action. The important question of how to subdivide our bands can be settled by a poll or some similar method later. Now every amateur should make it his business to follow carefully the further developments leading toward the 1947 international telecommunication conference. It is not sufficient to sit back and assume the other fellow is doing it. It is our personal opinion that United States amateurs were ably represented at the conference. But should pressure from U.S. government departments who neither understand nor appreciate amateur radio become too great it may be necessary for the hams to bring the matter to the attention of elected government representatives. The F.C.C. unfortunately is only one participant at the conference. The State Department, etc., also have a p tent voice. In the amateur fraternity there is a source of united strength that may have to be tapped more than once before we have won the fight for our frequencies. It behooves every amateur in this country to keep himself fully abreast of the progress made in frequency negotiations. The good amateur, like the good voter, is well informed. And remember, no matter how trite it may sound, no better expression has ever been coined—"United we stand—divided we fall."

Amphenol

ALL-WAVE ANTENNA

GETS ALL THREE!



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FM

Purchasers of modern radios deserve good reception on all three bands—standard broadcast, short wave and frequency modulation. Until Amphenol engineers perfected this new all-wave unit, the only way to achieve this was to install three separate antennas, a costly and unsightly solution.

The FM section of this new 3-way antenna is a horizontally polarized dipole. It operates most efficiently between 88 and 108 mc.

A 65-foot length of Amphenol Polyethylene covered copper wire serves as the standard broadcast and short wave antenna. The polyethylene covering minimizes precipitation static and assures long life

A specially designed series M derived low-pass filter automatically switches the energy from the proper antenna to receiver input.

Installation is simple. The mounting is a 1-inch steel mast 5-feet in length. All hardware is included. A guy clamp bolted to the mast provides for tripod guying

Vinyl-jacketed Amphenol 52 ohm coaxial transmission line serves as a low-loss lead in and eliminates interference from transmission line pickup. Noisy areas are not a problem with this antenna

In a comparative test with the best available standard double doublet (with matching transformer) the Amphenol All-Wave Antenna proved far superior in gain – as well as being interference free

Write for complete technical data, or see your jobber for full information

AMPHENOL ALL-WAVE ANTENNA UNIT INCLUDES:

- ★ FM dipole with molded phenolic weatherproof filter housing
- ★ 50 feet Amphenol RG-5/U 52 ohm coaxial cable
- ★ Steel mast 5 feet long with guy clamp and adjustable insulator
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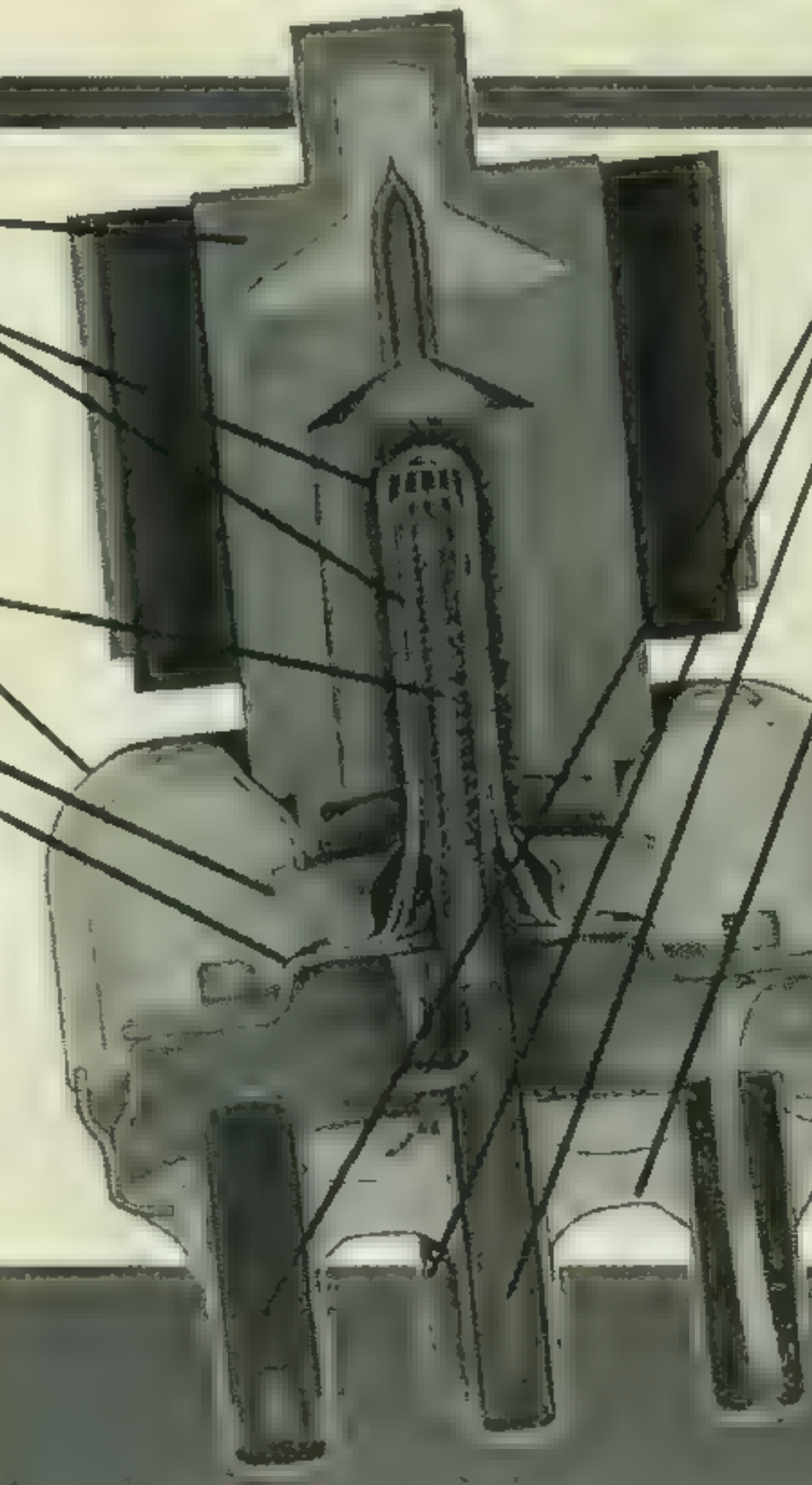
NOW THE 4X500A POWER TETRODE

Now, with the new 4X500A, the advantages of the Eimac-designed tetrode are brought to the 500-watt class.

The 4X500A includes the outstanding VHF performance, stability, ruggedness, and freedom from undesirable primary and secondary grid emission that have made the Eimac 4-125A and 4-250A the obvious choice of transmitter engineers for important sockets in both low-frequency and VHF applications.

Here is a transmitter-man's tube intended to make life more simple for the transmitter engineer. The 4X500A is designed for functional application; note the nearly perfect shielding between grid and plate circuits made possible by the low-inductance screen mounting disc which terminates in a contact ring on the envelope. The large low-inductance tubular control-grid lead within the envelope terminates at the center of the base. This design makes it easy to build coaxial tank circuits around the 4X500A. These are only two of its many features. Among others are the rugged 500-watt air-cooled anode, Eimac-processed grids, and silver-plated terminals pointed out below.

It isn't necessary to design your transmitter around promises. Eimac 4X500A tetrodes are available NOW. They'll deliver as much as 1750 watts useful output at 110 Mc. with but 25 watts driving power (two tubes). They'll deliver 3500 watts at the same frequency with 50 watts driving power (four tubes, push-pull-parallel). Complete operating information and ratings are in the technical data sheet for the 4X500A—now available on request.



1 External Anode, 500 watts dissipation, forced air cooled.

2 Control and screen grids precisely aligned—assures maximum plate efficiency and low control and screen grid currents. (Primary and secondary grid emission is positively controlled by exclusive Eimac grid processing.)

3 Double spiral filament—rugged, stable emission.

4 Hard glass envelope—ample r-f insulation.

5 Electron bombardment shield.

6 Rigid, low-inductance screen grid mount assures improved VHF operation and permanent alignment.

7 Filament terminals—heavy duty, large contact areas.

8 Control grid terminal—low inductance, logically placed for maximum isolation between input and output circuits. Centered for use in coaxial cavities.

9 Molded glass base—maintains precise alignment of all terminals for ease and simplicity of insertion in sockets. Makes possible compact design, and low inductance lead engineering. (All base terminals plus concentric screen grid terminals are silver plated for minimum r-f resistance.)

10 Concentric ring and pin type screen grid terminals for VHF and cavity circuits or pin sockets.

CROSS SECTION
EIMAC 4X500A
POWER TETRODE

ELECTRICAL CHARACTERISTICS

4X500A POWER TETRODE

Filament: Thoriated Tungsten
Voltage . . 5.0 volts
Current . . 13.5 amperes

Direct Interelectrode Capacitances (Average)
Grid-Plate . 0.05 *uufd*
Input . . . . 12.8 *uufd*
Output . . . 5.7 *uufd*

Maximum D-C Plate Voltage . 4000 volts

Maximum D-C Plate Current . 350 ma.

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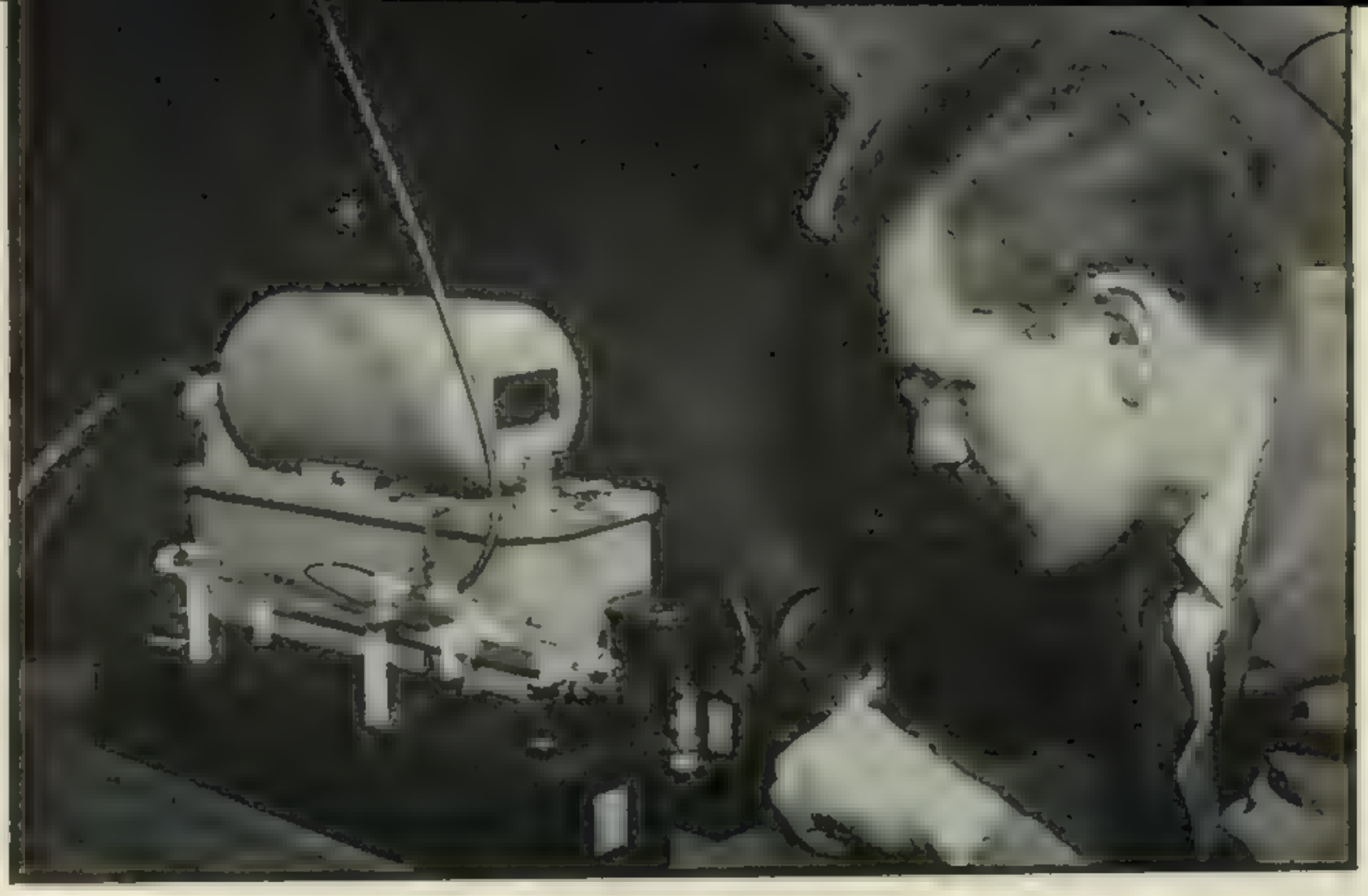


A test-setup showing the 10-watt mobile modulator used in conjunction with an HY-Q 75 oscillator The entire rig is operated from a surplus Signal Corps genemotor.

A COMPACT MODULATOR FOR THE MOBILE RIG

HERBERT G. RYAN, W1KVQ*

Phone for the mobile rig employing instant-heating modulator tubes. Substantial savings in battery drain allows greater use of equipment.

HOW MANY TIMES, while operating mobile, have you had to QRT because your battery had become discharged? If you are a mobile fan, you have probably had this experience often.

Obviously one cannot use cathode-type tubes for push-to-talk, since their heating time is much too long. Although it is true that for low power, receiving-type tubes are cheap, the small additional cost of the quick-heating type of tube is more than offset by the greater convenience and the saving in battery drain. Engineering tests have proved that instant-heating tubes draw only 4% of the current that cathode types do over extended periods of operation!

Many of you have already enjoyed the quick-heating advantages of instant-heating r-f tubes in your mobile 2-meter transmitters. Fewer amateurs, however, have used instant-heating modulator tubes. The commonly employed 6N7G, 6V6GT, and 6L6G require considerable warm-up time which usually results in the heaters being run constantly with consequent high battery drain.

Quick-Heating Modulator

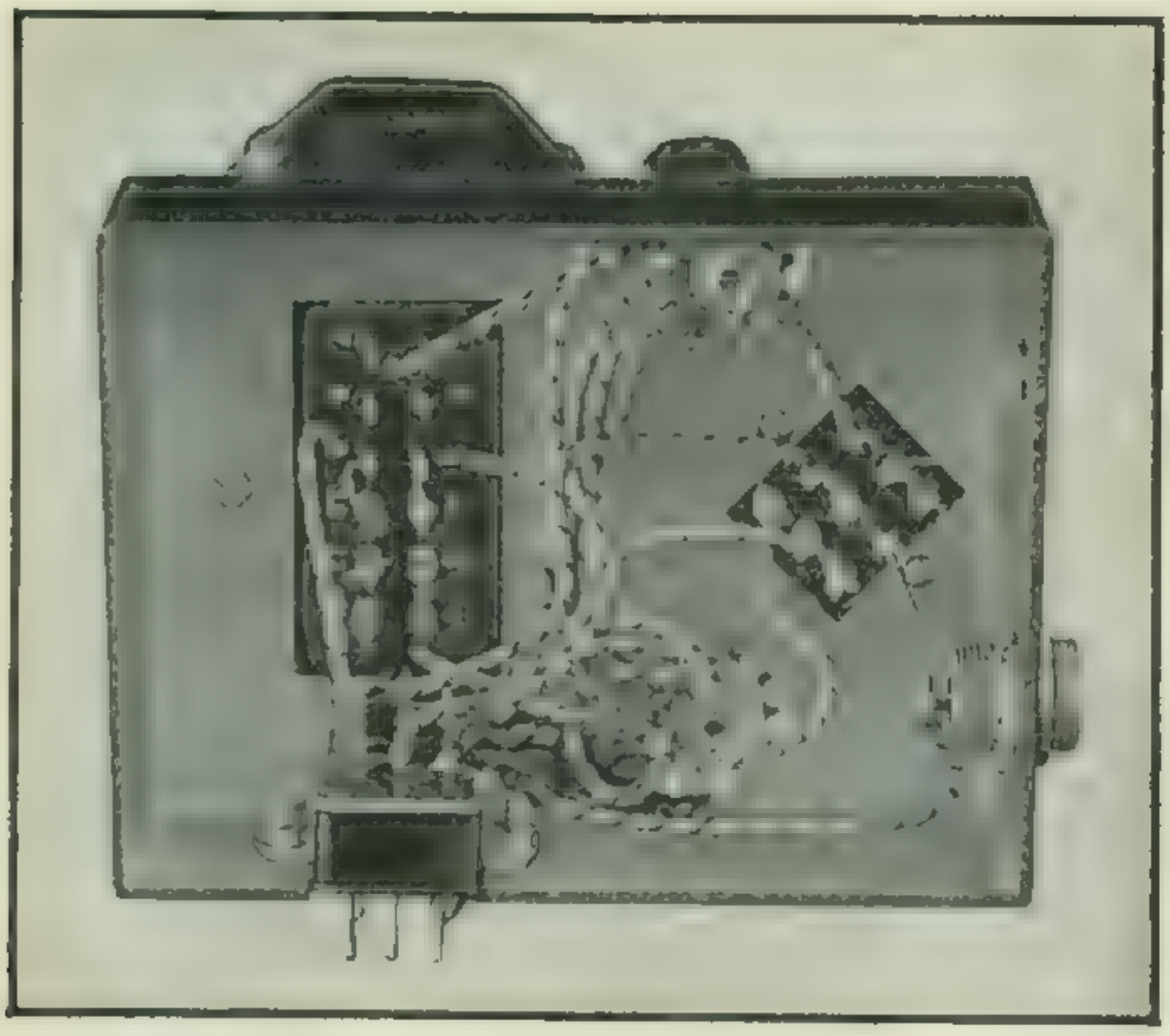
The 2E30, a miniature r-f beam pentode recently introduced by Hytron, is an answer to the problem of reducing battery drain of modulator filaments in a medium power mobile transmitter.

The instant-heating 2E30 is ideal for dynamotor or vibrapack operation, because its plate and screen require but 250 volts. Two 2E30s operated class AB1 with 250 volts on plate and screen, -22.5 volts bias, and a peak grid-to-grid voltage of 40 volts, will produce 10 watts of audio.

2E30s have such high power sensitivity that the output of a single-button carbon microphone, with a suitable step-up transformer, will drive two of them in class AB1 to their full power output.

Compactness and portability are prime requi-

*101 Lovett St., Beverly, Mass.



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Wiring of the mobile modulator is a matter of minutes as this photograph of the bottom clearly shows.

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sites in mobile work. Often, however, modulation transformers sacrifice efficiency for compactness. A good audio transformer, or any transformer for that matter, has the following losses inherent in its construction: Copper loss due to the resistance of the windings, core loss due to the iron necessary for good coupling between the windings, leakage reactance loss, and frequency response loss due to distributed capacitance. The copper losses encountered in an audio transformer may be minimized by using sufficiently large wire. The core losses may be reduced by making the size of the core sufficiently large to pass the maximum amount of flux generated in the primary by the signal voltage. Frequency response loss due to leakage reactance and distributed capacitance may be reduced by proper design of the transformer windings. If these losses are not considered

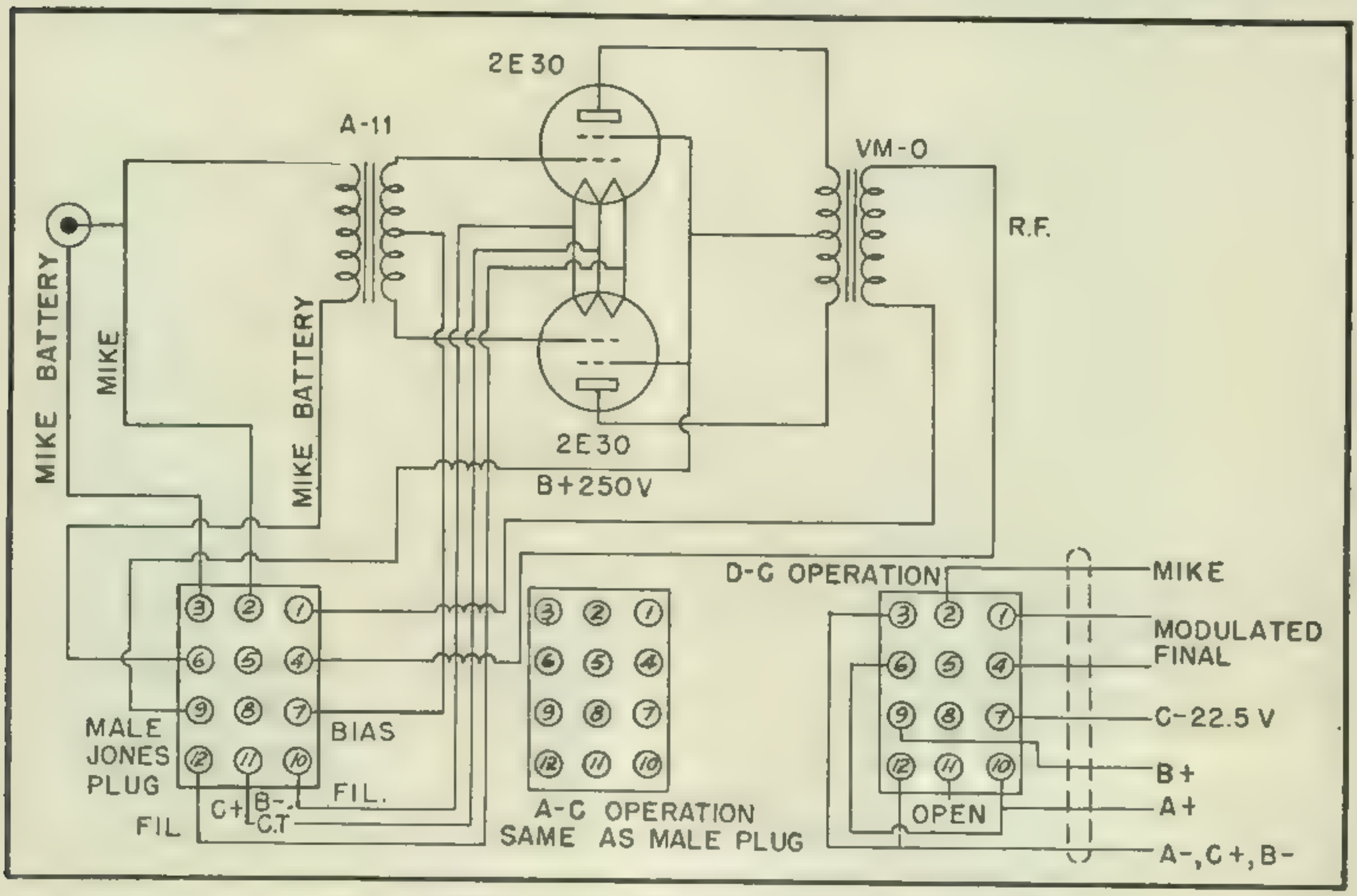
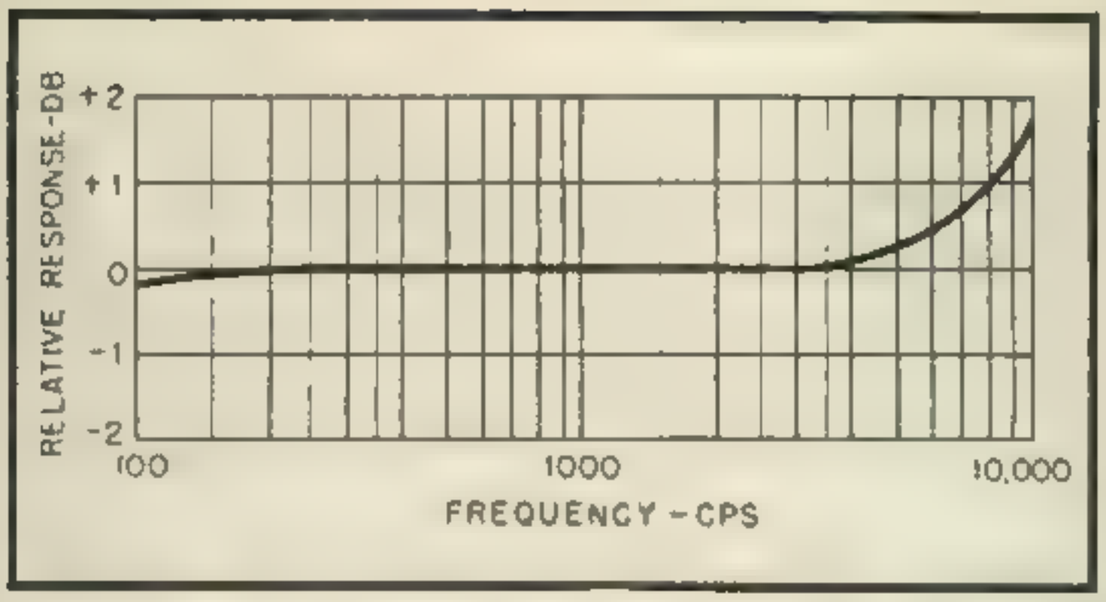


Fig. 2. Circuit of class AB1 10-watt quick heating modulator.



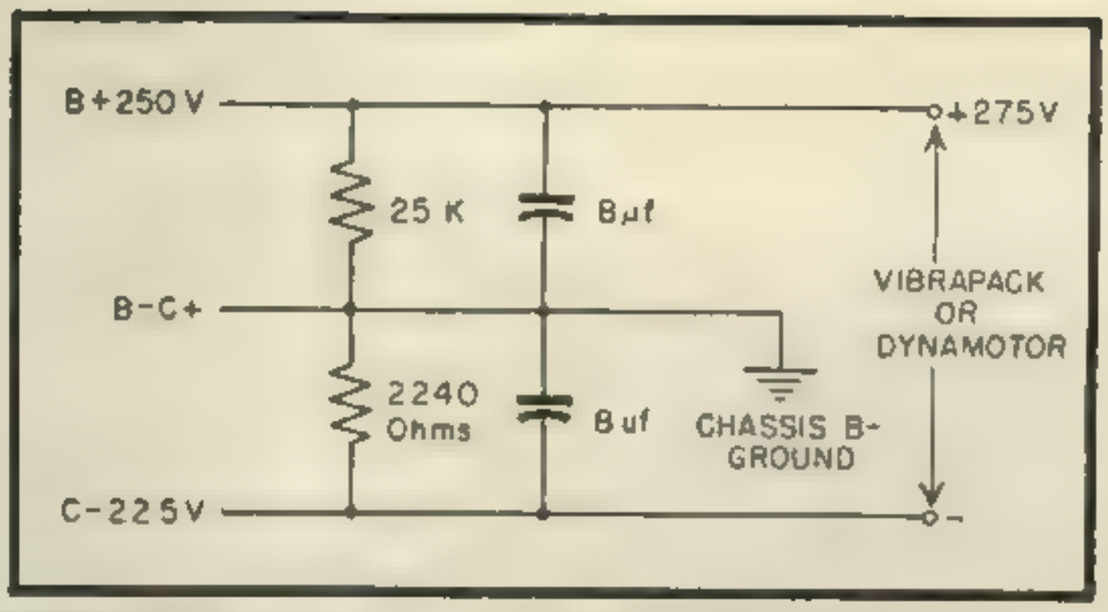


Fig. 1. (left). Frequency response using a UTC VM-O modulation transformer and a UTC A-11 input transfomer
Fig. 3. (right). Alternate method for obtaining bias.

in the choice of the input and output transformers, much higher inputs to the modulator will be required for a given audio output. Reduction in power consumption by the use of instant-heating tubes would then be offset by the increased power consumption from the plate supply.

Of course, for compactness and portability one cannot use the large transformers necessary to keep the losses to an absolute minimum, but a good compromise can be realized by using well-designed transformers. In our case, we decided to compromise with a UTC VM-O modulation transformer and a UTC A-11 input transformer. These transformers have good efficiency and excellent frequency response, as shown in *Fig. 1*.

The modulator circuit, as shown in *Fig. 2*, is a simple push-pull beam pentode amplifier. Note that there are no bias resistors. It is easier and cheaper to use a small hearing-aid battery for the required -22.5 volts of bias. In this rig, we used a 30-volt Burgess K-20 battery, altered by slitting the paper wrapper and tapping at 22.5 volts. This is a simple procedure, since the ends of the cells are readily accessible and easily tapped. Bias could also be obtained by dividing the output of the power supply as shown in *Fig. 3*. If

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Top view of the modulator shows a minimum of components required. The size of the input and output transformers will actually determine physical dimensions of the modulator.

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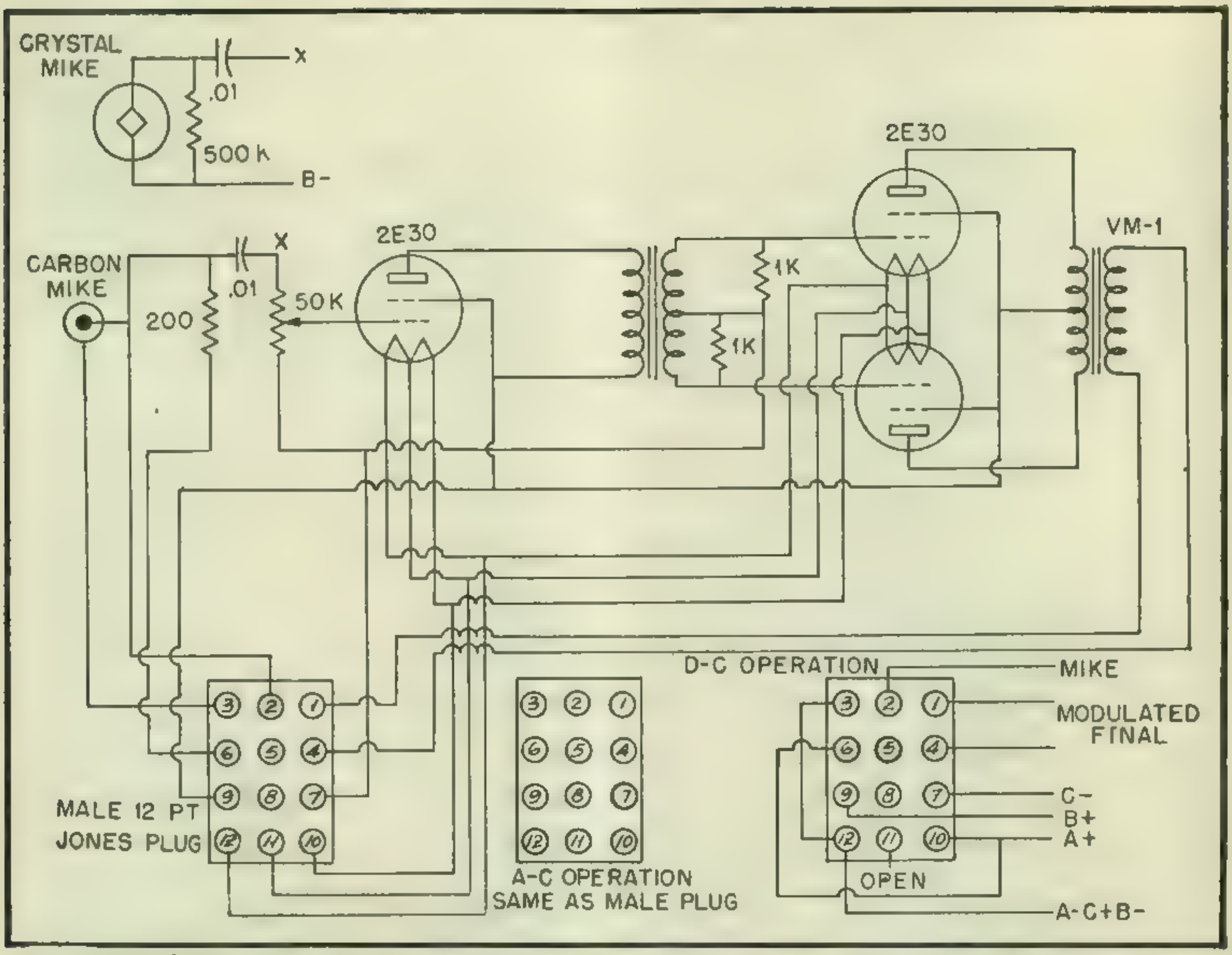

Circuit of Ab2 17-watt quick-heating modulator. Alternate circuit for substituting crystal microphone is also shown.

one is using the type of vibrapack that has a voltage switch, the switch is placed in the 275-volt position, and the tap of the bleeder returned to the negative connection of the plate supply. This produces the necessary -22.5 volts for bias and slightly over 250 volts for the plate and screen. The two sections of the bleeder must be heavily by-passed for adequate regulation. This method is more expensive, cumbersome, and complicated than one using a battery, and so it is not recommended.

Although this unit is designed primarily for mobile work, further examination of *Fig. 2* shows that with the proper connections made to the power plug a standard a-c power supply may be used, if a small battery is included for the microphone current.

Circuit Design

Construction of the unit is easy, because the only components required are a power plug, two transformers, two miniature sockets, and small chassis. By the "brute force" method employing a vise and hammer, we formed our own chassis of 1/16-inch aluminum. Observe that there are no ground connections to the chassis, with the exception of the transformer shields. The chassis was not made the ground point, since filament connections are different for a-c and d-c operation.

After the unit has been constructed, it should performs as follows:

Plate and screen potential	250 volts
Grid potential	-22.5 volts
Filament potential	6.0±5%
Plate current, no signal	48 ma
Plate current, max. signal	82 ma
Screen current, no signal	3 ma
Screen current, max. signal	10 ma
Load impedance, plate-to-plate	6000 ohms
Percentage of distortion	3.6%
Approximate power output	10 watts

Often, however, 10 watts of audio power is not sufficient. By simply changing the class of operation from AB1 to AB2 and adding a stage of 2E30 speech amplification, the 2E30s as class AB2 modulators will deliver 17 watts of audio. In making this change, it should be remembered that different transformers will be required. The output transformer must be changed, because the power requirements are higher. The driver transformer must be changed, because the 2E30s will draw grid current in class AB2, and hence the grid impedance must be kept low to minimize distortion.

[*Continued on page 79*]

Coax for your Antenna

MARVIN J. FEIN, W4KIT*

Solid dielectric coaxial cables are widely used in the post-war ham shack. Their advantages, special features, and some of the more common applications are discussed in this article

NUMEROUS types of solid dielectric coaxial cables are now available at prices that place them within reach of the average ham. These cables were developed during the war, and they are used in large quantities in radio, radar and sonar installations. The smaller size cables are used as r-f, pulse and video transmission lines, and larger cables—capable of carrying average powers in excess of ten kilowatts at thirty megacycles—are used in many modern radar equipments to transmit power from the transmitter to the antenna array. Because of the relatively low-loss properties of the newer type flexible coax they have been used successfully to transmit power at frequencies as high as 22,000 megacycles.

Prewar Coax Cable

Prior to the war coaxial cables fell into two categories determined by the dielectric material. Gas-filled coax lines were used by many broadcast stations to feed their antenna systems. However, because of the high initial installation cost very few hams could take advantage of the excellent results obtained from a well-built, properly maintained, gas-filled line. Rubber dielectric cables were developed for ham applications, but these cables naturally had higher losses than gas-filled lines and could not be used successfully in long lengths at high frequencies.

*409 Park Place West., Palmetto Gardens, North Charleston, S. C.

Wartime Solid Dielectric Cables

At the outset of the war a definite need was felt for a concentric transmission line that combined the desirable properties of gas and rubber dielectric cable. The desired line would have to embody the low-loss properties of gas-filled coax and would also have to possess enough flexibility so that metal elbows would be unnecessary. Most gas line installations use soft-drawn line, eliminating elbows. The new cable would of necessity have to be rugged, because in many applications it would be subject to extreme shock and vibration.

Large quantities of cable with a polyisobutylene mixture dielectric were produced early in the war. Cables known as PT-5, CAASF-50-1, CAASF-70-1, etc. were in this category. In many respects these cables were superior to any previously developed solid dielectric lines. However, they had two outstanding faults: (1) the dielectric material would melt at relatively low temperatures, (2) the line attenuation would in-

TABLE 1

DB LOSS PER HUNDRED FEET VS. FREQUENCY IN MEGACYCLES

Description	Frequency in megacycles 7	14	30	60	120	240
* 70 ohm rubber insulated twisted pair	0.9	1.5	3.0	.....	.....	.....
* Flexible rubber dielectric coax.	1.5	2.5	4.2	.....	.....	.....
* ⅜" gas filled coax with inner conductor on bead spacers.	0.6	.....	0.9	1.3	.....	.....
**RG-8/U and RG-10/U, nominal impedance 52 ohms.	0.42	0.68	1.0	1.5	2.25	3.8
**RG-11/U and RG-12/U, nominal impedance 75 ohms	0.38	0.59	0.94	1.4	2.05	3.4
**RG-34/U, nominal impedance 72 ohms.	0.38	0.59	0.94	1.4	2.05	3.4
**RG-59/U, nominal impedance 73 ohms.	0.80	1.2	1.9	2.8	4.1	6.3

*Data obtained from: *RADIO Handbook **American Phenolic Co.*

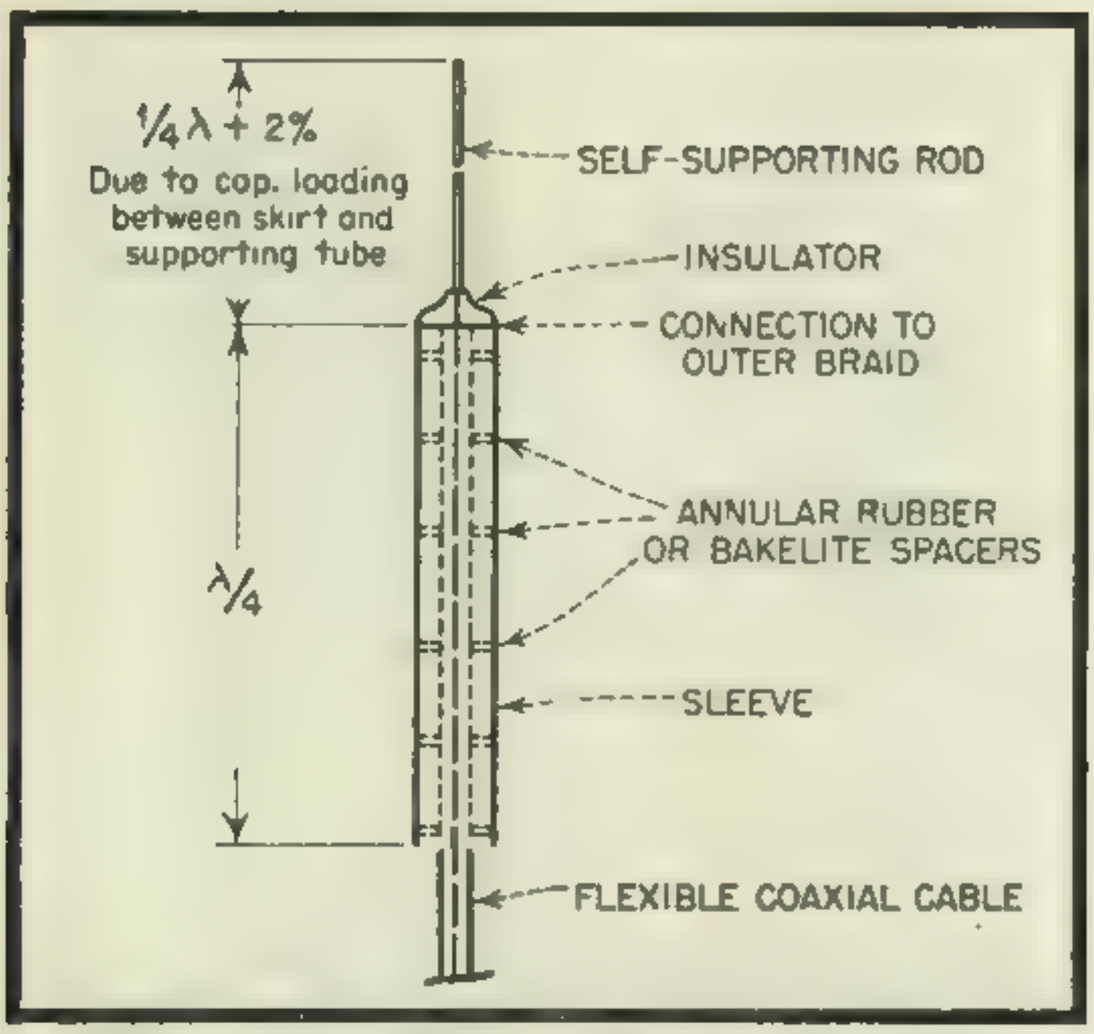

Fig. 4. Sleeve-type antenna fed with coaxial cable. Unless a detuning sleeve is placed below the skirt, the coaxial cable should be brought off at a right angle.

crease with age. The amateur should beware of these cables. They are easily recognized by their soft white or amber dielectric material; heating this material with a soldering iron will cause it to become gummy and rubbery.

By August, 1943, a new type of dielectric material was used in all flexible r-f cable production. This material, stabilized polyethylene, is grey, translucent and hard. Its softening point is about 35° F. higher than any material previously used. Touching polyethylene with a hot soldering iron will cause it to melt quickly. The weatherproof jacket on practically all polyethylene cables is made of vinylite, an excellent abrasive resistant material. For many shipboard applications the vinyl jacket is covered with braided steel wire to form a protective armor.

Polyethylene cable is usually referred to by a joint Army-Navy-designation, RG- /U. Tables 1, 2, and 3 list the properties of typical polyethylene cables. For the sake of comparison the attenuation of a typical rubber-insulated twisted pair, rubber dielectric coax, and gas-filled coax is also given.

Advantages of Solid Dielectric Coax

The advantages of a good solid dielectric coaxial cable as a feeder for ham antenna installations are:

(1). Extreme ease of installation.
(2). Lower loss and higher power rating than any other cable of comparable size (except properly maintained gas-filled coax).
(3). Cable can be routed close to nearby objects or even strapped to them.
(4). Adverse effects due to icing of the line practically eliminated.
(5). Practical elimination of feeder radiation which results in the following advantages:
  (a). Reduction of broadcast interference.
  (b). Reduction of feedback due to stray r.f. in the speech amplifier.
  (c). Reduction of beam antenna pattern distortion when a bazooka or re-entrant transformer is used.
(6). Practical elimination of man-made interference due to receiver antenna feeder pick-up.

Precautions

Polyethylene dielectric coax is normally considered as being flexible. However, experience has proved that this dielectric will cold-flow if subjected to excessive pressure; therefore, a few precautions should be heeded. As a general rule of thumb the radius of curvature of any RG- /U bend should not be less than ten times the over-all diameter of the cable. As an example, RG-34/U (over-all diameter 0.625") should not be installed with a bend of less than 6¼" radius. If cable clamps are used to support the cable to a mast or to the wall of the shack, these clamps should be

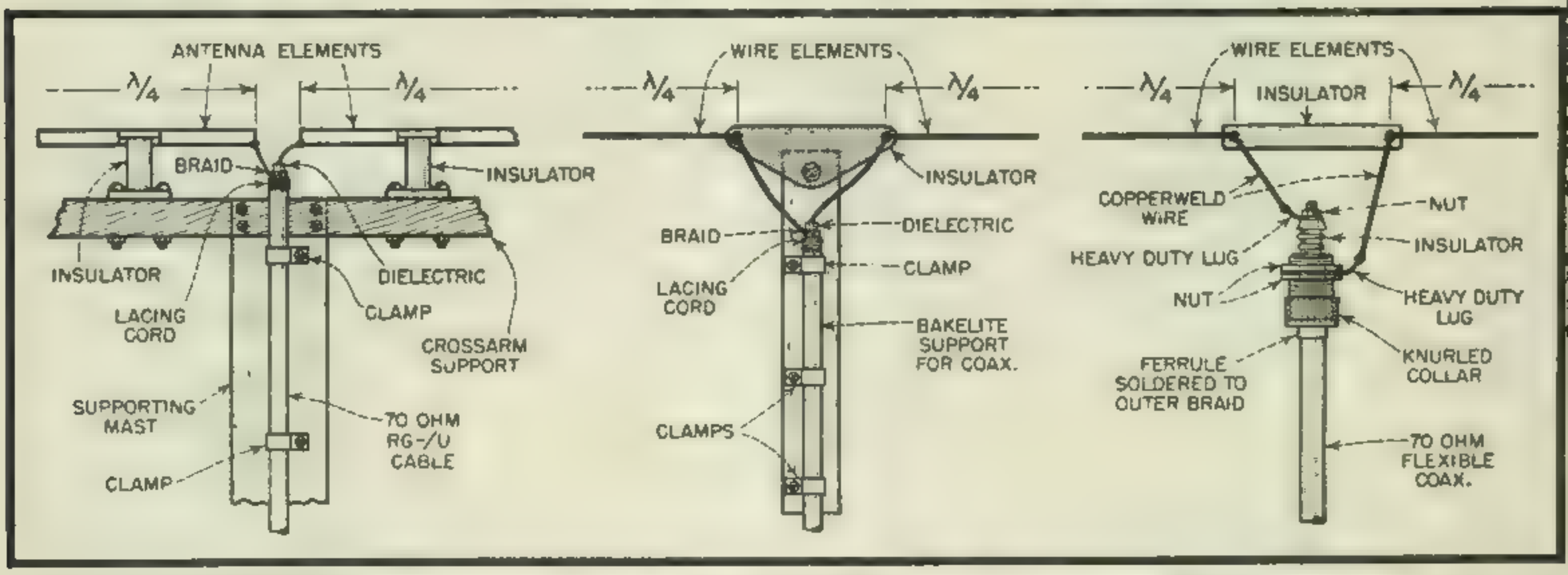

Fig. 1. (left). Self-supporting dipole fed with flexible coaxial cable. Fig. 2 (center). Dipole antenna with wire elements fed by flexible coaxial cable. Fig. 3. (right). Wire dipole with flexible coaxial cable terminated in an end seal.

pre-fabricated to form a snug fit around the cable. The clamps should not fit tightly enough to deform the cable, and the clamp should never be shaped by hammering it around the cable.

Practical Applications

Numerous types of antennas can be successfully fed with polyethylene dielectric cables. A self-supporting horizontal dipole—practical on 14 megacycles and higher—is given as a detailed example. This assembly is shown in *Fig. 1*. Any of the 70 ohm RG- /U cables such as RG-11/U, 34/U and 59/U can be used to feed this antenna. The cable should be strapped to the supporting structure so that no tension exists where the connections are made to the antenna elements. In making up the antenna end of the cable, the vinyl jacket should first be cut back about two to three inches with a sharp knife, and the exposed copper conductor can then be unbraided or "combed" by running a nail through the braids. The fanned-out braid should then be twisted together to form a usable lead to the outer conductor. About ten turns of lacing cord should be wrapped around the end of the vinyl jacket directly below the junction of the outer conductor lead and the outer conductor. The cord can be secured in place with Glyptal or similar cement. This type of construction is obviously applicable to the radiator of a parasitically excited beam antenna with quarter-wave spacing between the self-supporting elements.

Dipole antennas with wire elements can be constructed in the same manner as the self-supporting dipole if a mast to support the coaxial cable is placed at the center of the antenna. Another method of accomplishing the same thing without using a center mast is illustrated in *Fig. 2*. Hanging the coaxial line directly to the wire elements without a support for the feeder is not recommended since the polyethylene dielectric is bound to "cold flow" at the Y formed by the outer and inner conductors. If suitable coax end seals can be obtained the problem of feeding a wire antenna will be greatly simplified. A wire doublet fed with solid dielectric cable terminated in an end seal is shown in *Fig. 3*.

The development of the sleeve-type antenna shown in *Fig. 4* was made possible by coaxial transmission line. These antennas are relatively easy to construct with flexible coax cable. Numerous v-h-f police stations have used this antenna to obtain a low angle, omnidirectional pattern.

The impedance looking into the center of the radiator of a conventional three-element close-spaced array is approximately eight ohms. It just isn't feasible to produce a satisfactory transmission line with so low a characteristic impedance, and therefore a matching device must be

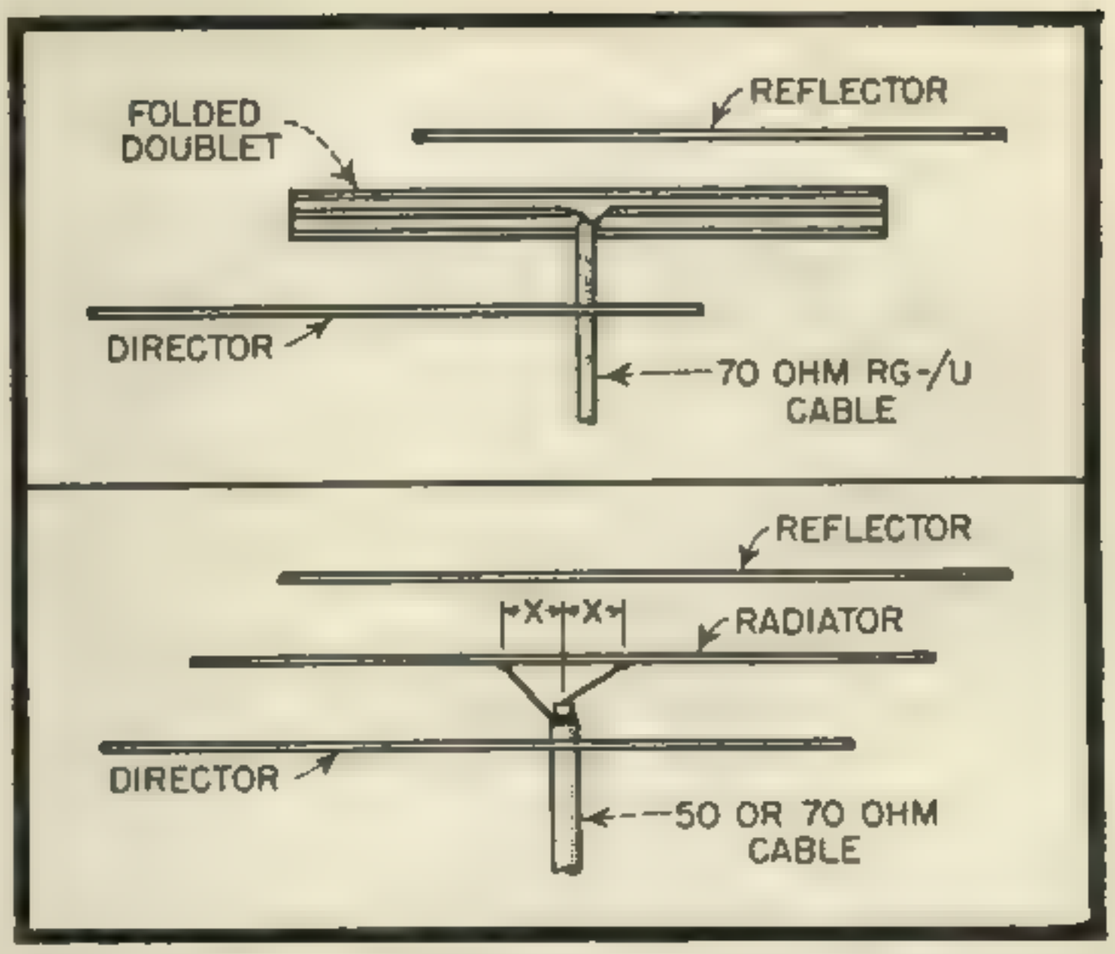

Fig. 5. Close-spaced three-element beam with folded dipole radiator fed with 70 ohm RG-/U cable. Fig. 6. (bottom) Close-spaced three-element beam, delta matched to flexible coax cable.

used if conventional fifty or seventy-ohm lines are to be employed to feed this array. By using a folded doublet consisting of three conductors, *Fig. 5*, as the radiating element of the beam the impedance can be raised to about seventy ohms, and the antenna can then be fed with RG-11/U, RG-34/U or RG-59/U.

A simpler matching method for the three-element close-spaced array is illustrated in *Fig. 6*. In this case a delta matching transformer is used to effect a suitable match, and the antenna can be fed with either fifty or seventy-ohm cable. Dimension x can be obtained experimentally by cut-and-try methods; the standing wave ratio in the transmission line should be used as a criterion to check the match. In order to check the standing wave ratio along a solid dielectric coax line a temporary electrical eighth wavelength of coax can be installed between the transmitter and the normal input end of the line. (This temporary line should have the same impedance

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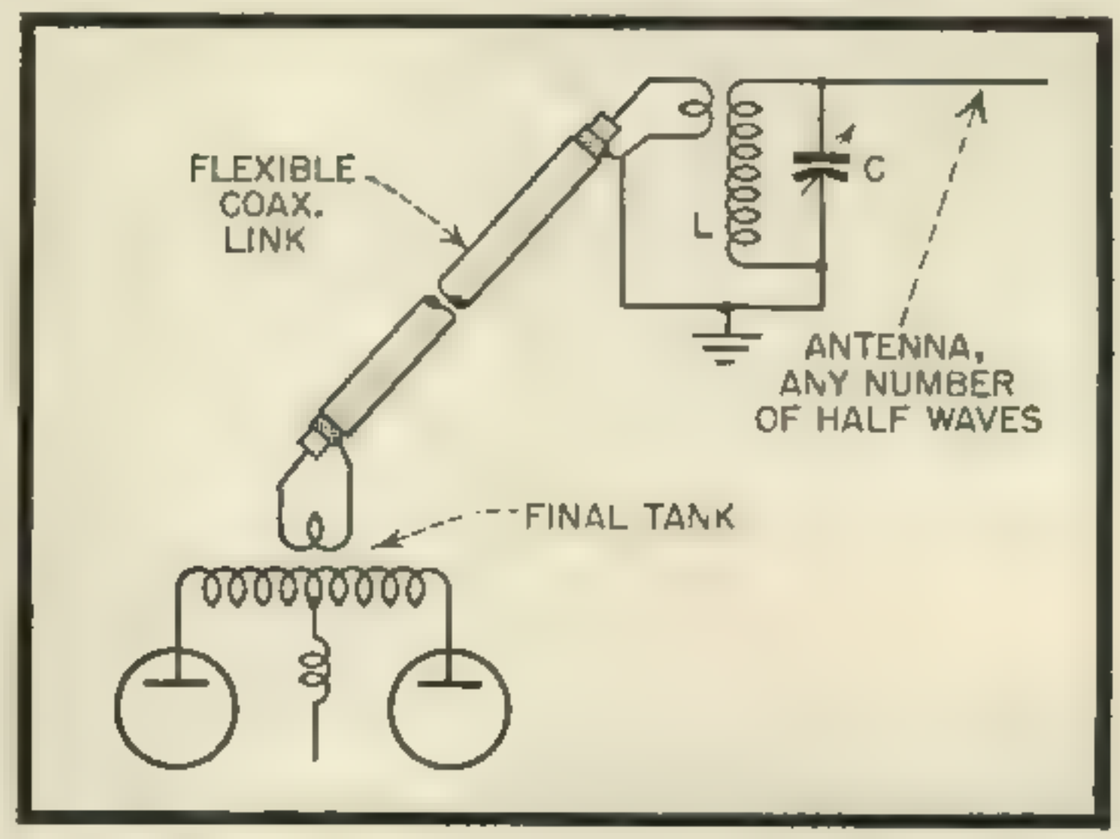


Fig. 7. Flexible coaxial cable used to link-couple final to antenna.

Cut Your Coils—Once!

HENRY L. COX, W8UPS*

DO YOU WIND high-frequency coils that are much too large and then spend a cautious hour or more attempting to prune them down a turn or two at a time? If so, you will be interested in this simple, time-saving way to wind coils right on the nose the first time.

The Basic Idea

The idea behind this method is this—a length of wire wound into a conventional solenoid can be made to have the same inductance as that length of wire formed into a single-turn circular loop. For example, suppose a piece of wire twelve-and-a-half inches long is formed into a single-turn loop four inches across and its inductance is measured. This inductance will be equal to that obtained if the same piece of wire is rewound into a two-turn coil two inches in diameter and a half-inch long, or a four-turn coil one inch across and one inch long. Slight discrepancies in the final inductance may be corrected by squeezing or spreading the turns of these coils. (*Fig. 1*).

It is apparent that when the inductance of the single-turn loop becomes directly proportional to the diameter of the loop, it must also be directly proportional to the length of the wire employed in the loop. Thus the length of wire in a loop is a measure of the inductance of that loop, and also of the inductance of any coil that may be wound from that piece of wire, if the coil length is carefully chosen.

Since the inductance of a coil depends partly on its length we must specify the coil length, or more conveniently, the ratio of length to diameter, in order to wind a coil to a given inductance. If a single-turn loop is to be rewound into a multi-turn coil of the same inductance, the values shown in *Table 1* should be carefully followed. This table shows the ratio of length to diameter, corresponding to the number of turns in the coil. However, if a coil has more than ten turns, the length becomes great in proportion to the diameter. If we wish to maintain a high *Q*, we should try to keep the length-to-diameter ratio reasonably small. For this reason, the graphs presented in this article are most useful in the high-frequency and v-h-f regions, where most coils are wound with ten turns or less. The graphs may be extended further into the low-frequency range, but they will result in coils of impractical dimensions, unless very high C tank circuits are to be used.

*Box 3091, University Stn., Columbus 10, Ohio

Using The Graphs

To wind the average v-h-f coil, merely cut the coil wire a little too long, bend it into a single large loop, prune the coil to the right inductance and rewind it into as many turns as you like, in the finished form. Make that loop at least roughly circular—hairpin-type turns just will not work with these charts. And don't forget to

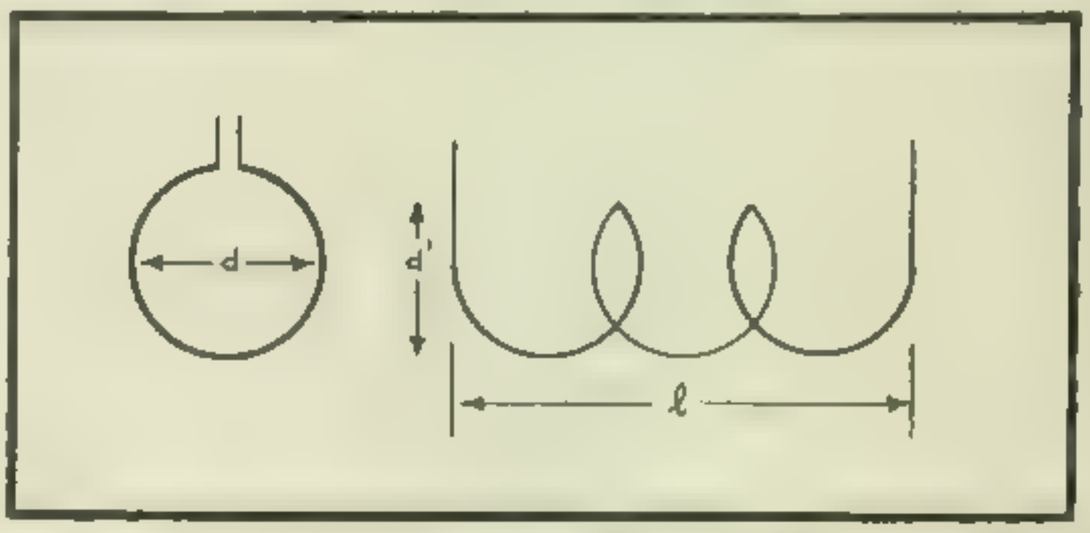


Fig. 1. The inductance of a single-turn loop of specific dimensions may be compared to that of a coil incorporating the same length of wire. (See text.)

allow a half inch or more for lead lengths. If necessary, the turns of the finished coil may be spread or squeezed slightly to hit the exact inductance. As a rule of thumb, remember that a four-turn coil should be as long as it is wide.

The two graphs, *Fig. 2* and *Fig. 3* have been prepared to show the frequency vs. capacity variation for several common lengths of wire. For example, if a coil tuning the 6-meter band

TABLE 1

Number of Turns	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Ratio $\frac{\text{Length}}{\text{Diameter}}$	0	$\frac{1}{3}$	$\frac{2}{3}$	1	$1\frac{1}{3}$	$1\frac{2}{3}$	2	$2\frac{1}{3}$	$2\frac{2}{3}$	3	$3\frac{1}{3}$	$3\frac{2}{3}$	4	$4\frac{1}{3}$

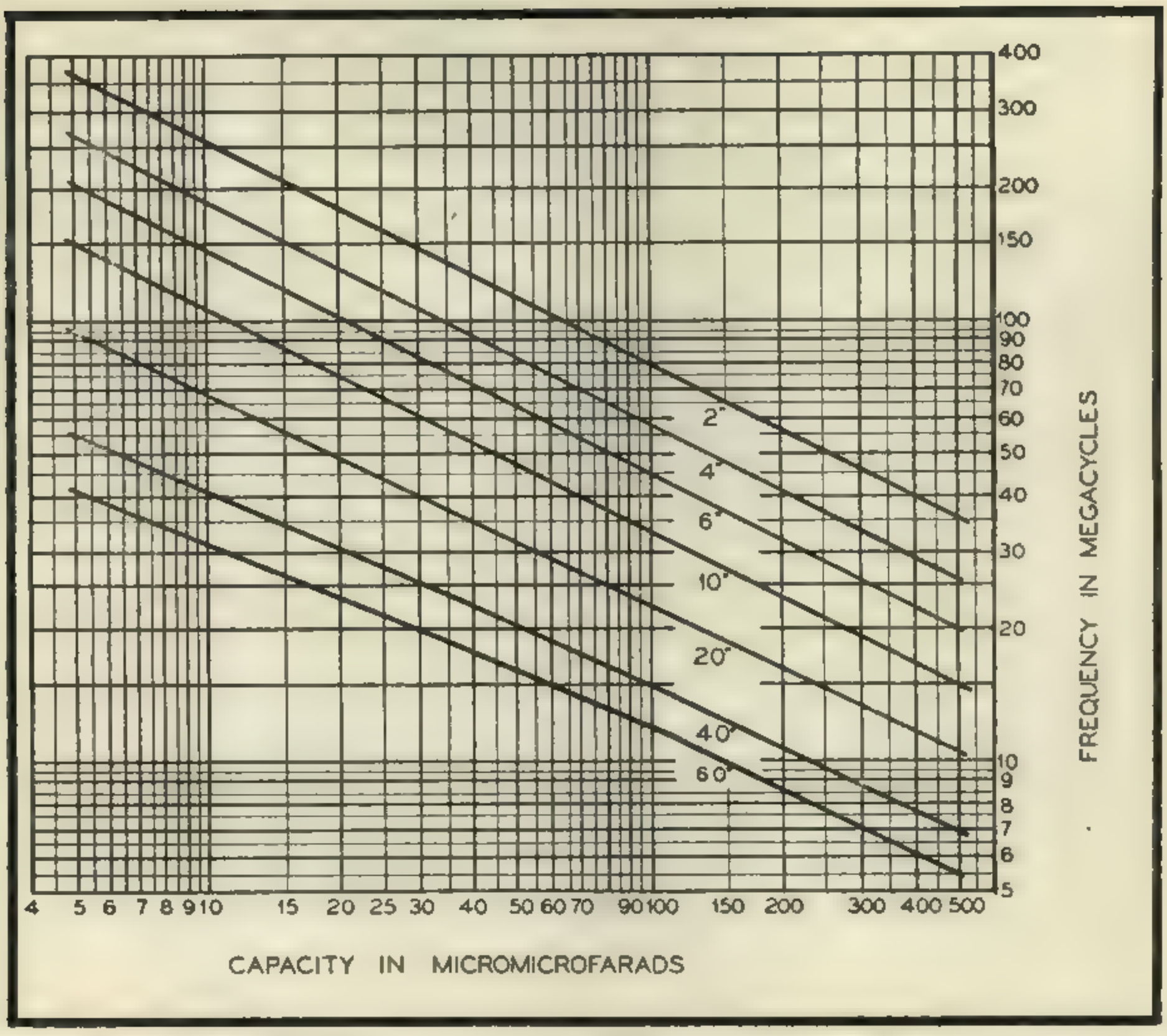


Fig. 2. Coil winding may be greatly simplified by keeping a specific ratio of the length to the diameter of the coil. When this ratio is maintained, the length of the wire in the coil is proportional to the capacity of the circuit and the frequency of operation. Common lengths of No. 14 wire from 1 inch to 60 inches are indicated with the necessary tuning capacities as abscissas and the resonant frequencies as ordinates.

with a total of 50 $\mu\mu$f is desired, the chart in *Fig. 2* shows that 8½" of No. 14 wire may be used. If the wire size is smaller than No. 14, decrease the length slightly. About 7¾" of No. 20 wire could be used instead. The chart of *Fig. 3* is similar to that of *Fig. 2*, but it has been extended to cover much higher and lower capacity ranges. Both charts were prepared from data gathered experimentally on a standard Boonton Q meter.

A final example will show the accuracy to be expected from these charts. A coil from the junk-box, consisting of four turns of No. 16 wire, ⅞" in diameter was spread to a length of ⅞" in accordance with *Table 1*. Using a parallel capacity of 40 $\mu\mu$f, the resonant frequency was measured as 48.1 mc. The coil was unwound and formed into a single turn 4" in diameter. With the same capacity, the resonant frequency was found to be 47.6 mc. When the wire was straightened, it was found to be 11½ inches long. The chart, *Fig. 2*, indicates for this length of wire and capacity the frequency should be 49.5 mc. However, because the charts are based upon No. 14 wire size, the predicted frequency should be reduced by a few per cent for the smaller diameter wire; thus the charts are well confirmed.

APPENDIX

Derivation of Fig. 1

Given: *A single-turn loop and a multi-turn solenoidal coil, both coils wound from equal lengths of wire.*
Problem: *To determine the length of the multi-turn coil which will cause it to have exactly the same inductance as that of the single loop.*

Since both coils are wound from the same length of wire, the resulting diameter of the multi-turn coil will be inversely proportional to the number of turns. Therefore, we have

$$d' = \frac{d}{n} \qquad (1)$$

where

d = diameter of single turn loop in inches
d' = diameter of the multi-turn coil in inches
n = number of turns

According to Terman's *Radio Engineering Handbook* (Section 2, Paragraph 11, formula 56) when using the coil diameter instead of radius, and by assuming single layer (or zero radial depth) in every case, we get for the inductance of a coil

$$L = \frac{0.2\, d^2\, n^2}{3d + 9l} \qquad (2)$$

where:

L = inductance in microhenries
l = length of coil in inches

For our particular multi-turn coil, we should rewrite equation (2) by inserting d' for the general d, therefore

$$L = \frac{0.2\, (d')^2\, n^2}{3d' + 9l} \qquad (3)$$

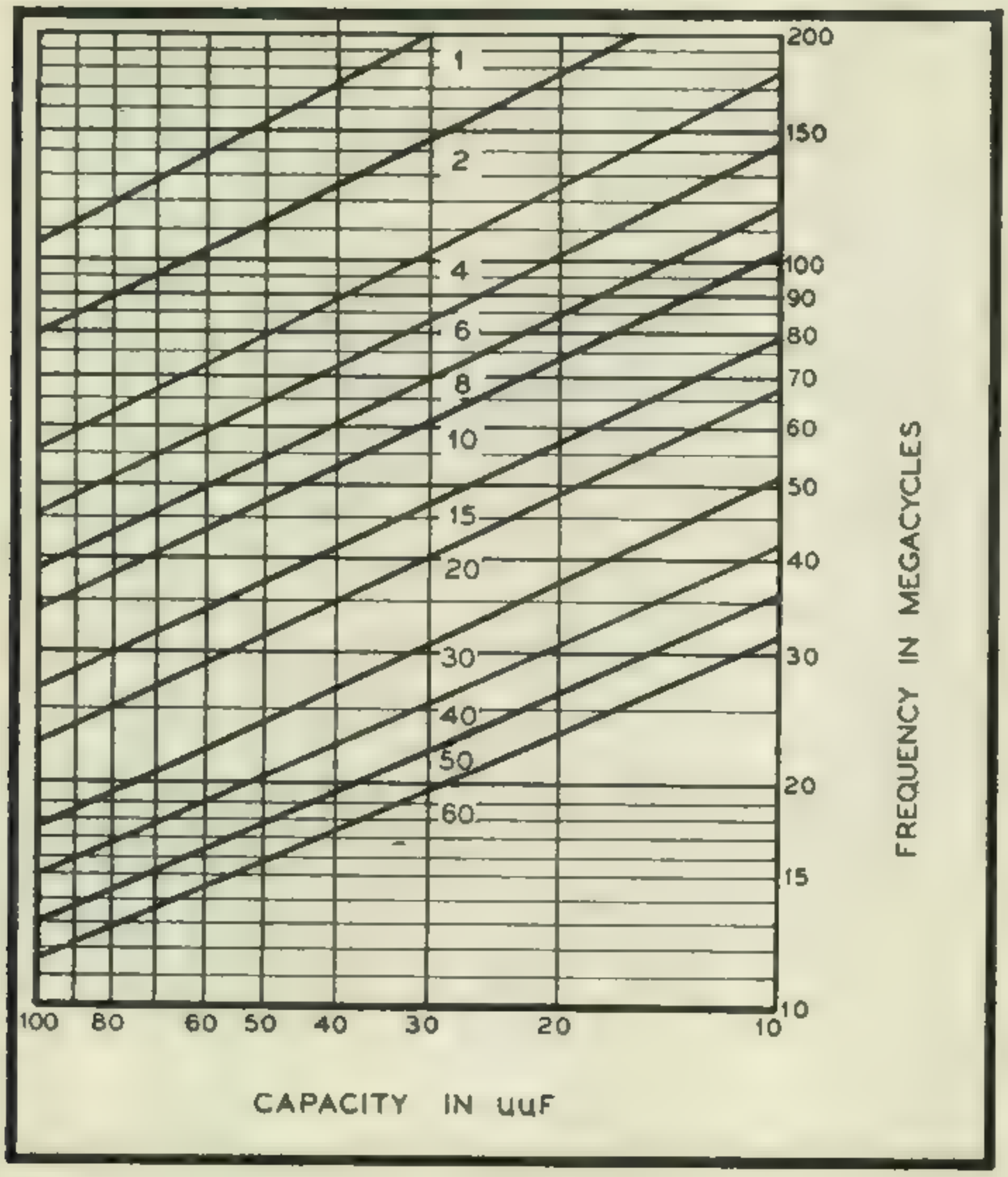


Fig. 3. Extension of Fig. 2 to include higher and lower values of capacity and high frequencies of operation. Inset values represent common lengths of No. 14 wire used in coil winding. Reduce frequency 10 per cent for No. 20 wire. Values on graphs are in inches.

However, (2) may be reduced for a single-turn coil to

$$(4) \qquad L = \frac{0.2}{3} d$$

When (1) and (3) are combined, we have

$$(5) \qquad L = \frac{0.2\left(\frac{d}{n}\right)^2 n^2}{3\left(\frac{d}{n}\right)+9l}$$

But since (4) will be equal to (5) we may say that

$$(6) \quad \frac{0.2d}{3} = \frac{0.2\left(\frac{d^2}{n^2}\right)n^2}{3\left(\frac{d}{n}\right)+9l} \text{ or } 1 = \frac{d}{\frac{d}{n}+3l}$$

from which, by using equation (1), we obtain

$$(7) \quad l = \frac{d'}{3}(n-1), \text{ or } \frac{l}{d'} = \frac{n-1}{3}$$

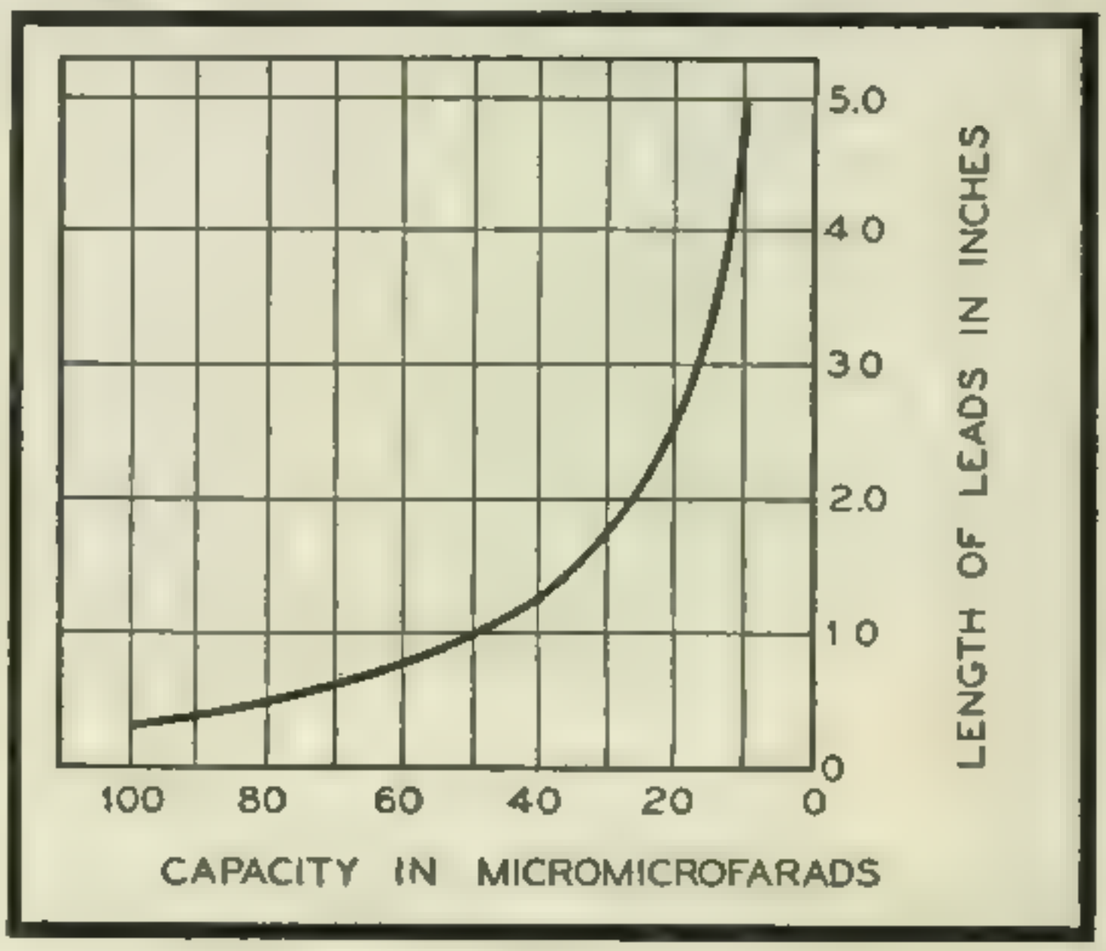
By substituting typical values of n (n=1, 2, 3, ...) into equation (7), we may construct or extend the values of *Table 1*.

Condenser By-Passing at Two Meters

AT A FREQUENCY of 144 mc the ordinary postage stamp mica by-pass condenser consists of the capacity in series with the inherent inductance of the foil and plates and leads. By reason of these circumstances a condenser with certain lead lengths will react at 2 meters as a series-resonant circuit.

This effect may be calculated and is usable resonance. It is however best to determine the capacity on the basis of the largest value with the physical required lead lengths. This is evident since if an effective by-pass circuit is to be constructed any point on one side of by-pass resonance will be inductive and on the other side the effect will be capacitive. Some of these

[*Continued on page 76*]



Building a Relay Rack

HOWARD A. BOWMAN, W6QIR*

One way to beat the steel shortage is to build your own rack. This unit can be constructed with a minimum of tools. Dimensions allow the use of standard panels and chassis.

THERE IS NOTHING novel about the idea of building a relay rack, but there is apparently quite a gulf between the idea and the reality. Up to quite recently we were unable to find a single ham among those we knew who had a relay rack which came anywhere near approaching standard dimensions for this type of construction, except those who were fortunate enough to have a manufactured rack.

As we think back, the reason seems obvious. It was, simply, that doing the necessary metal work in steel was too much of a task for the average ham with his collection of hand tools.

Now, however, the situation is radically altered. There is coming on the surplus market in ever-increasing quantities, aluminum and dural in various forms. A casual visit to one of the dozens of surplus outlets which have sprung up since VJ day will reveal stacks of "skins"—aluminum sheets—which hams can always use in chassis, panel, and shield construction, as well as for a multitude of other items, and extrusions of a thousand and one shapes and sizes.

Having always wanted a rack of standard dimensions, we decided that now, if ever, was the time to build it. The aluminum material was cheap. If correctly handled it is very strong. Best of all, it is easily worked with hand tools. If the builder has a drill motor—electric hand drill—the job is duck soup.

Basic Data

The first step is to get the necessary information with which to estimate material needs. To do this, we sought data on the standard rack in various radio publications. Most such information comes in the form of drawings which are a bit difficult to decipher, so the essential data are presented herewith in tabular form:

1. Height of rack: Some multiple of 1¾". This is the actual panel height in use, exclusive of decorative trim or reinforcing sections at top or bottom. To this height may be added ⅛" for top and bottom clearances.

2. Width of rack: May depend on dimensions of materials used. In any case, the dimension between the inside edges of front uprights must be at least 17¼" (standard chassis are 17" wide), and the dimensions between outside edges of the same members must be no less than 19" (standard panels are 19" wide).

3. Depth of rack: Of no consequence if open type construction is used. If the rack is an enclosed cabinet type, the inside depth should be about 16" or more.

4. Mounting holes: Mounting holes are drilled and tapped 10-32 into the front vertical members of the rack. Center lines are spaced ⅜" from the vertical edges of each panel, thus are 18¼" apart. Holes are spaced ¼" below top and ¼" above bottom of each 1¾" rack unit. On front members

Details of the rack lying on its side and viewed from the top, with top dust-plate removed. Main channels, front and rear, are at right and left of photo. Details of assembly are shown in Figures 1 and 2.

*2048 W. 77 St., Los Angeles 44, Calif.

of rack, holes are thus spaced alternately ½" and 1¼", except those at extreme top and bottom of rack which may fall 5/16" from top and bottom support members for ease in clearing.

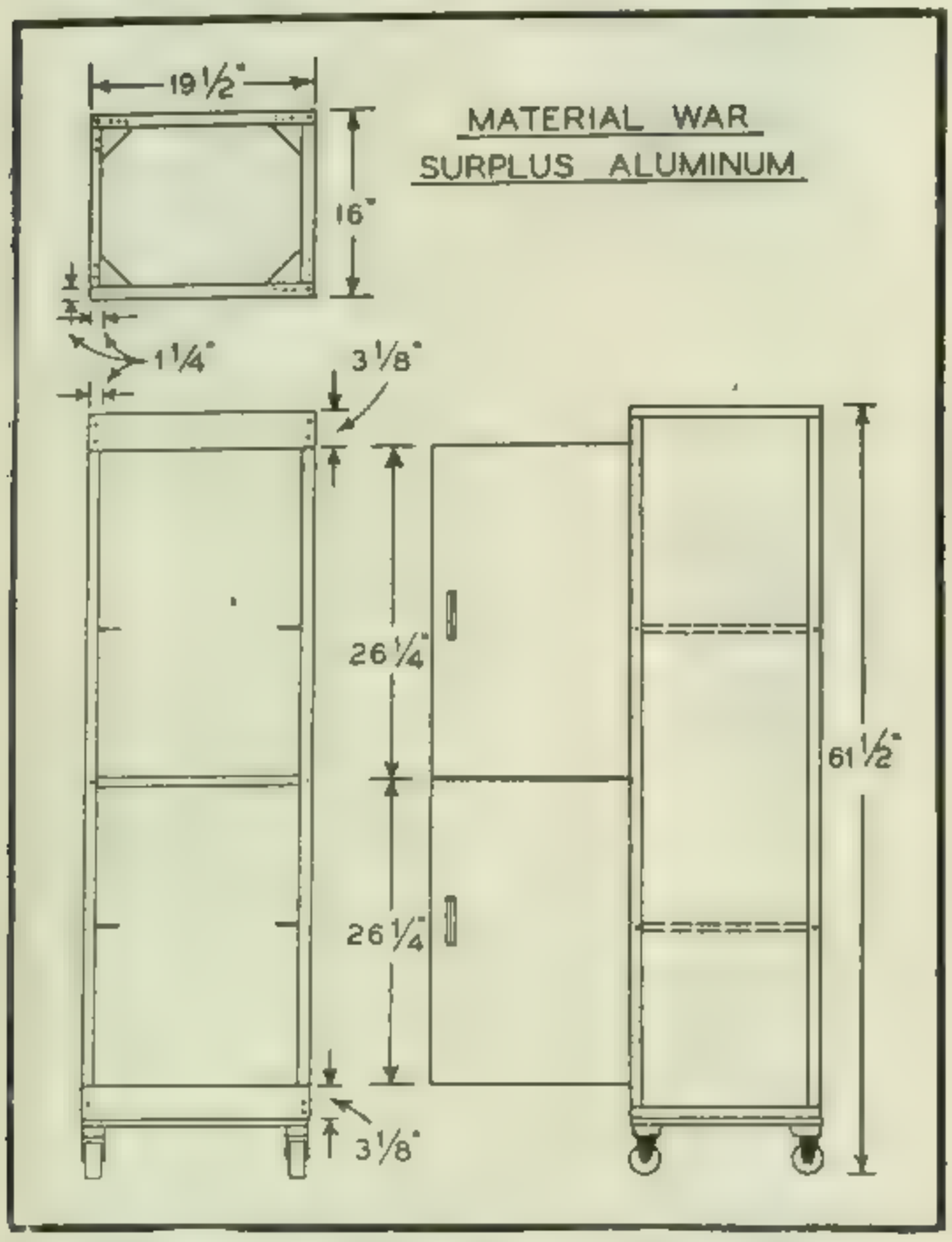
5. Panels: Panels are 19 inches wide, usually ⅛" to ¼" thick. Mounting holes are drilled ⅜" from each vertical edge, to clear 10-32 screw. These may be slotted to edge of panel. Panel height is some multiple of 1¾" less 1/32" for clearance.

The above are the essential dimensions for standard constructions. It goes without saying that all mounting holes need not be drilled in either panels or vertical rack members. If panel positions are known, only three or four holes to a side are needed. Drilling and tapping all holes in the rack facilitates later panel changes, however, and is not difficult.

The width and depth of the rack are variables to some extent, depending on the materials used and on the style of rack one wishes to build. The height is semi-fixed. After the number of rack units needed has been decided upon, the only height variable lies in the dimensions of materials used for top and bottom cross members. Other dimensions should be followed rigidly.

Choosing Materials

We wanted to build a rack about five feet high and sixteen inches deep. It has turned out to have outside dimensions of 19½" wide, 16" deep, and 61½" high, including the dolly on which the rack rides. The materials used in the rack itself are 100% war surplus except for the door latches.



Over-all dimensions of the completed rack. The doors open independently of each other. For some applications the rack may be turned about, a solid panel used on the rear, and equipment access made through the doors on the front.

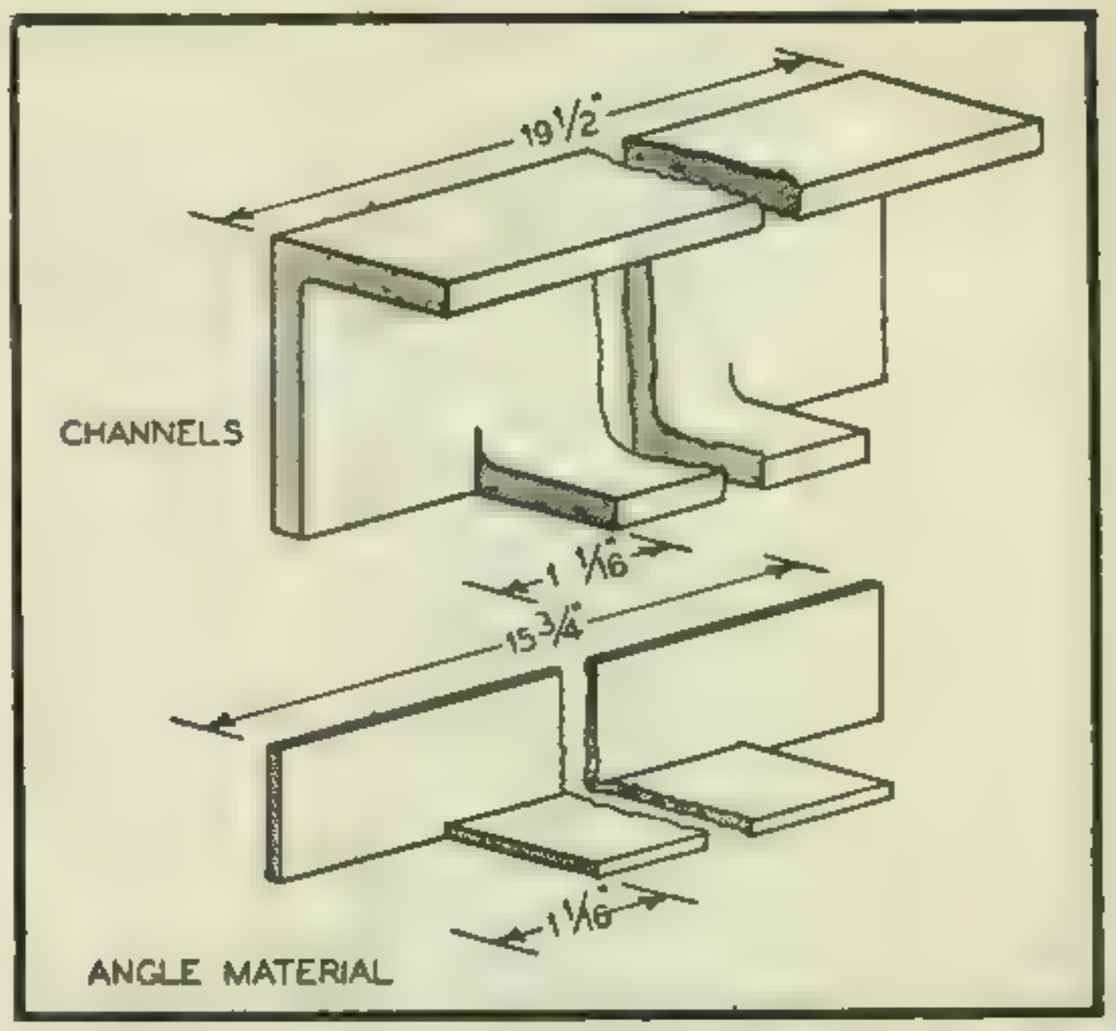


Fig. 1. (top). Channels used for horizontal members at top and bottom of both front and back of rack. Cutout is made to permit angle material to mount front-to-rear angle member flush. (bottom). Front-to-rear angle member. Assembly of parts is shown in Figure 2.

For the sake of simplicity it will be assumed that the builder will use the same type materials as we used, although they need not necessarily be the same dimensions. If care is used in following instructions, the dimensional variations will take care of themselves. The materials were chosen to provide a simple construction which would be adequately strong.

All structural members are 24ST dural. They are secured with 10-32 machine screws, Shakeproof washers, and nuts at points where there is any structural stress. Side panels, doors, and gussets are fastened with 8-32 screws. Gussets are .051" in thickness, side panels and doors,. 040"

For horizontal members at top and bottom of both front and back, we used four pieces of channel. This channel measures about 3/16" in wall thickness, is 3⅛" across the bottom of the "U", and 1¼" deep. Each piece is cut the exact width (outside dimension) of the rack. This dimension depends on the size of the vertical rack members. We used 1" angle for these members as well as for the front-to-back pieces at top and bottom of both sides. If angle of some other dimension is used, the length of the pieces of channel should be 17½" plus twice the width of he angle material. If the angle has two sides of unequal width, decide first which dimension will fall at front and rear of the rack, and which dimension at the sides. Use the front and rear dimension in the above formula for determining the length of the pieces of channel. If channel is not available, pieces of heavier angle stock may be used equally well.

Top and Bottom Sections

We built the top and bottom sections first, the idea being to postpone a decision as to the rack

height and join these sections by means of the vertical members when that decision was made.

Each of these two sections is made up of a front and rear piece of the channel, plus two side pieces of the angle stock. Because the vertical members must enter and be fastened to these assemblies, and because it is wise to have all parts come flush on the sides, it is necessary to do some cutting and fitting. We cut a piece measuring 1/16" from each end of one side of the channel. This cut must be made at all four corners of the top and all four corners of the bottom. It permits the vertical members to enter the assembly and lie flush along the inside of the channel. If angle is used in place of the channel, this cut is unnecessary.

In order that the vertical members shall not overlap the side members of the two assemblies, a piece 1/16" long is cut from each end of each side member. When later assembled, the vertical members will extend into the top and bottom assemblies, lying flush along the inside surface of the channel, and coming flush with the vertical portion of the angles used for front-to rear members. This sounds very involved, but a glance at *Fig. 1* and the photographs will make the whole affair obvious. *Fig. 1* shows how the pieces are cut, and *Fig. 2* shows how the assembly goes together.

The top and bottom sections may now be assembled. One piece of channel and one piece of angle are clamped together at a corner, making sure that they fit flush at the edges, and the pieces are drilled and joined with a 10-32 screw, lockwasher, and nut. The same is done with the other pieces. Two of these assemblies may now be joined to form the top section, and the other two joined to form the bottom section. In joining these, use a carpenter's try-square and get them absolutely square. Draw the screws up tight. Next cut eight gussets as shown in *Fig. 2*. Clamp a piece of wood across one corner after making certain that it is exactly a right angle. Insert the gusset and clamp it in place, then drill to take two or three 8-32 machine screws along each edge. Do the same for all other gussets. When these are in place, top and bottom sections are complete.

In doing the work detailed above, one of the peculiarities of extruded material will have been observed. This is that the inside corners of the material are not properly corners at all, but radii. In fitting the angle into the channel, one finds that it is impossible to get the angle flush into the inside corner of the channel because of this radius. It is rather difficult to remove the radius, so the next best move is to modify the end of the material fitting into it. This is done by filing the end of the angle to an arc, so that smooth contact is made with the radius inside the channel. This should be done rather carefully and measurements frequently made so that dimensional irregularities may not be produced.

Vertical Members

With top and bottom sections completed, the next step is to make and install the four vertical members. Their length depends upon the panel height needed, plus the variable governed by the amount they extend into the top and bottom sections. We took a short piece of the angle stock to be used and inserted it just as the vertical members were to be inserted. It was clamped in place and scribed at the exact point at which it emerged from the assembly.

The distance from the scribed mark to the end of the piece of angle was now carefully measured. The total length of the uprights is equal to *twice* this distance, plus the panel height, plus 1/8" for top and bottom clearance. We decided on a panel height of 30 rack units. $30 \times 1\frac{3}{4} = 52\frac{1}{2}$". The vertical members are now cut exactly to length, and the ends filed if necessary so that they fit flush inside top and bottom assemblies.

They are inserted into their proper places one at a time, clamped in place and tried for square. When each insertion is perfectly square, holes are drilled to fasten the uprights to the channel at top and bottom. We used three 10-32 screws at bottom, two at top of each such assembly.

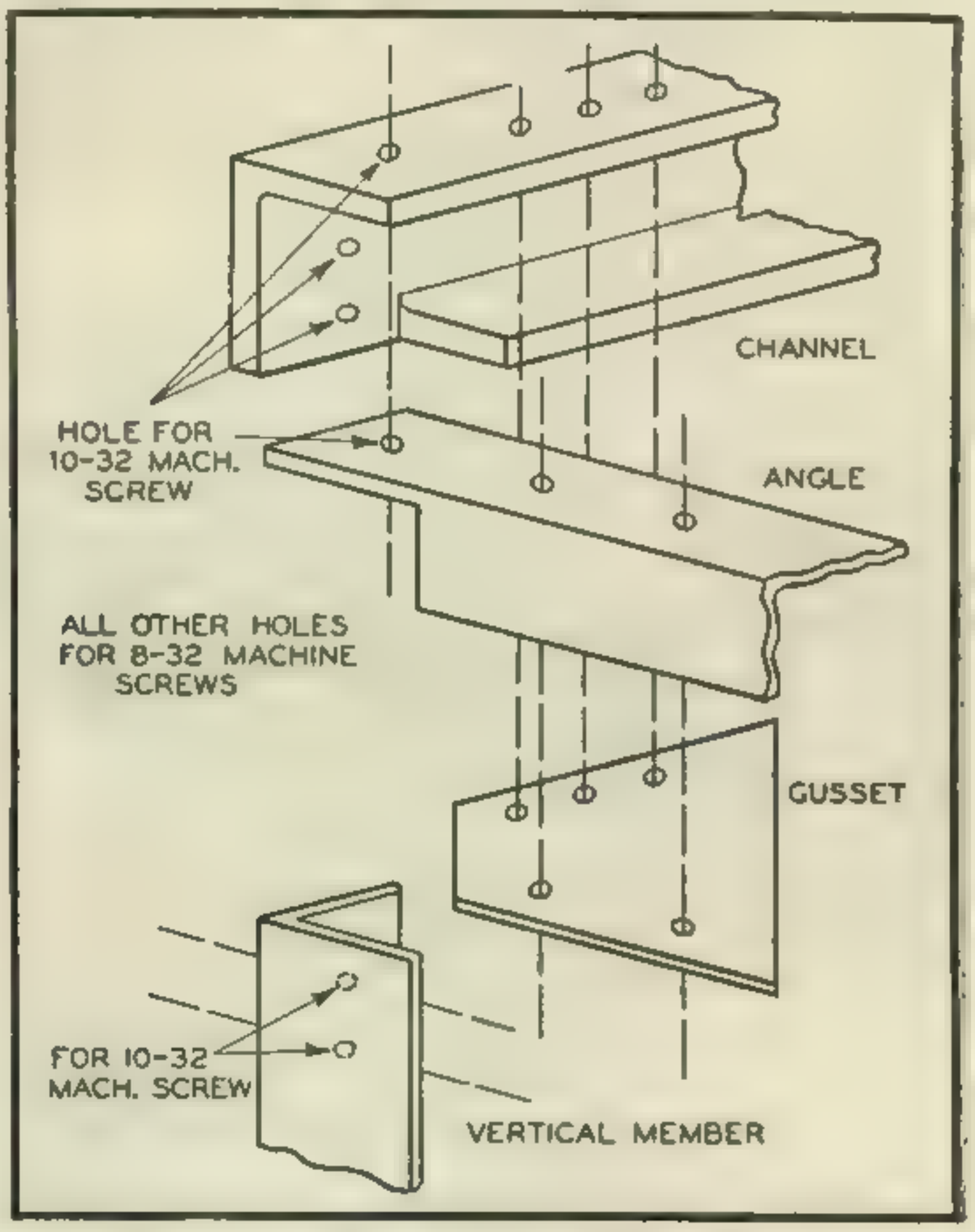


Fig. 2. Assembly of rack members. The front-to-rear angle is held to the horizontal channel in the corner. The gusset plate is fastened to the channel by three screws and to the angle by two screws. The vertical member is secured to the channel by two machine screws. Note that the vertical member holes are on the rear face of the angle as indicated by dotted holes.

When all four vertical members have been installed, the rack begins to look like something. It is stood up in its correct position, and the front members marked L and R with a grease pencil to prevent later mis-identification. Each of these front members is now carefully scribed at the point where it emerges from the top and bottom assemblies, and the two pieces are removed from the rack.

In order to spot the panel mounting holes correctly, it is necessary to know either the exact inside dimension between the front vertical members, or the exact outside dimension across them, plus the dimension of the material used. If 1" angle has been used, and the dimensions given in *Fig. 1* followed, the inside dimension will be 17½" and the outside dimension 19½".

Complete rack and dolly. Chassis supports can be located wherever desired, and need not follow the layout shown in this rack. Note panel mounting holes on front vertical members and stiffener strips riveted to rear doors.

Since panels are 19" wide and drilled or notched to a center line depth of ⅜" from each edge, it follows that the mounting holes must be 18¼" apart, or ⅜" from the inside edge of each front vertical member. A scribe with an adjustable stop is then used to mark a line ⅜" in from the inside edge the full length of each of these pieces.

Starting at the scribed line marking the point of emergence of one member from the bottom assembly, use a steel rule to lay off exactly 5/16". Scribe a mark here crossing the mark that runs lengthwise of the member, and prick-punch their point of intersection. A steel tape may now be clamped to the member, placing an inch mark exactly opposite this punch mark, laid out along the member and clamped again at the opposite end. Starting at the punch mark, lay out 1¼", then ½", then 1¼", and so forth, stopping frequently to see if the marks are accurate. Every ten or twelve marks, count the number of rack units laid out and multiply the thing out to tally it by the measurement on the rule. When all marks are made, the last one should be exactly 5/16" from the mark scribed to indicate where the member emerges from the top assembly.

Each scribed mark should be carefully punched, then drilled through with a small drill—No. 40 or so. Then drill through each hole with a No. 18 or 19 drill, trying to keep the holes at a right angle to the face of the material. If a drill press is available, it may be used here to great advantage. It is not a necessity, however.

The holes should now be tapped with a 10-32 tap. This may be done quite easily, despite the large number of holes, by clamping the tap in the chuck of a breast drill which has a slow speed. Five or six turns of the handle will run the tap through, and it backs out easily. It took us about twenty minutes to tap all the holes in one vertical member.

When the holes in both members have been completed, they may then be reassembled into the balance of the structure. If the rack is to be used without side panels and rear doors, gussets may be installed at the four corners of each side, to prevent front to back sway. Panels installed later will prevent side to side sway.

Side Panels and Doors

We wanted to make the job as complete as possible, hence added side panels and rear doors, as well as slides for the several chassis to rest upon. [*Continued on page 71*]

For Sale . . . One Rig

ERIC R. ADAMS, VE3ALG*

I, Alvin Hennessy, am not the sort of citizen who goes around hating his neighbors, but this guy Alf Gusher is more than should happen to anybody. The whole thing starts when I am transferred to the suburban plant of the Corn Waffles Company and being manager, a house goes along with the deal. This, to me, is heaven. It's out in the sticks where there's no ignition noise, no hash from street cars and lots of antenna room. Being a DX man it's the setup I've been wanting for years.

At first my job keeps me kind of busy, so I don't get on the air. But after a while I start working on an antenna Saturday afternoons and that's when this guy Gusher enters the picture.

Hanging over the back fence he looks peaceful enough . . . so to avoid being completely anti-social I engage in some minor conversation and after a while I learn he's retired. It seems that he invested in some mine in Eastern Brazil which paid off pretty nicely so that his time is his own and if his mind ran in that direction, which luckily it doesn't, he could put a kilowatt on the air and play with it all day.

Naturally, in due course, he asks me what I am doing and I inform him that I am putting up an antenna.

"I'm an amateur radio operator," I tell him. "I have a little radio station and I can talk to other amateur stations."

Gusher just sucks at his pipe for a while and then he says, "What do you talk about?"

*509½ Yonge St., Toronto, Ontario

Of course I don't talk about anything, but I can't tell Gusher that so I just tell him about the ham game in general and after a bit he says he thinks supper is ready and off he goes. It is not, unfortunately, the last I hear of him.

In due course I am nicely established at both the factory and at home. I have erected an impressive three-element beam, have succeeded in cornering one of the latest communication receivers and am running a modest 750 watts to a pair of 813s. DX is moderately good, and any day now I'm expecting a nice stack of foreign cards. My only wish is that I got home earlier so I could take advantage of daylight hours on 10 and 20 where all the good stuff is rolling through. As it is, I have to miss a lot of it and while I am piling up a fair number of G's, PAØs, Fs, SMs, ONs and items like that, I never snag the really elusive boys. I still need Asia and Africa for WAC and I wouldn't mind working more South Americans. It's around this time that I start thinking about Alf Gusher and what I'd do in his shoes. Maybe I shouldn't even have thought of the guy. Maybe there's something in thought-transmission after all.

As it is, I have just returned from a hard day at work when the XYL informs me that Gusher wants to see me.

"Mr. Gusher spoke to me today," she says. "He says he wants to start a radio station just like yours."

Now, as I said before, I am a fairly amiable sort of guy and I wouldn't mind extending the glad hand to a fellow ham . . . but after all, to have this guy Gusher running something next door isn't even funny. But being neighbors and all that stuff, I drop in to see him. Sure enough, he has the idea he wants to start a ham station.

I gag slightly, but upon regaining my composure I say, "It's really very simple, Gusher, old man, and any dope can do it, of course. But don't you think it would be better to go in for stamp collecting, or something like that?"

Gusher, however, has a one-track mind and he just shakes his head and says, "How do I be a ham?"

So I tell him how you have to learn the code, pass a government exam, get a receiver and transmitter, string up an antenna and all the rest of it.

"Maybe I could use yours," says Gusher thoughtfully, and if I wince at this point it is because I am not used to so much happening at once. The Corn Waffles business is a quiet trade and I have never done anything else. Then Gusher wants to know if there's a book he could read about amateur radio. So after telling him to buy a handbook, and hoping he won't, I go home to think things over.

Comes the dawn with blue skies and sun and I am feeling a bit better. I have it doped out that

the chances of Gusher getting on the air are pretty remote. After all, he doesn't know the first thing about ham radio and the way is well scattered with snares and pitfalls into which I'll be only too glad to direct him. Nevertheless, a certain feeling of apprehension lingers and it is not until several weeks pass and nothing further is heard that I am beginning to feel safe again.

But I am only kidding myself. One night from Gusher's residence I hear faint sounds of slow code and I realize with horror that a practice oscillator is at work. Gusher is learning the code.

I guess at this point I should have buried the hatchet, not in Gusher's skull, but in the good old ground, taken him firmly by the hand and helped him on the way. As it was, I content myself with a neutral sort of visit. Gusher waves me in and I find he's set himself up in the cellar. He has a few odds and ends in the way of tools and a code oscillator and key. A pair of cans are stuck on his head and on the table are the cluttered parts for what might be a t-r-f receiver.

"I got that book," Gusher says. "Picked one up in a secondhand store and it sure has got a lot of good dope in it."

I manage a smile of the type known as encouraging and sit down while Gusher goes on with the code. The guy can only go about 10 per, which is my approximate limit as a DX man anyway, but I have to admit that it is nice, clean sending. After a while I send to him and to my surprise he gets it just about solid. There is still, of course, the happy thought that he won't be able to make the t.r.f. regenerate, or maybe lack of transmitter parts will keep him off the air. Something may happen.

Happy weeks go by and one day Gusher asks me to look at the rig. That's what he calls it . . . "the rig." It is the handwriting on the wall, one of life's grimmer moments. I shuffle somewhat slowly toward his shack, wishing heartily for the return of 160 phone so that Gusher can go on it and have his license cancelled for BCL disturbance. Then I open the cellar door and what I see makes me think I have strayed into some museum.

Built in the most antiquated breadboard style that ever graced the pages of an early QST is a monstrous arrangement starting with a '45 and ending with a 203A. It is sprawled all over a table and Gusher, who is looking too triumphant, is standing well back so I won't miss anything. I think maybe it is all a gag, when I spot Gusher's "Handbook" and am amazed to see that he has picked up a 1927 model. I open my mouth to say something when I recall how he bought it in a second-hand book store. This, of course, explains the rig and also the receiver and suddenly I am seized with a great happiness. With such an outfit Gusher will never work anything. He'll QRM me for a night or two and then he'll give it all up.

In the midst of my revels I am interrupted by Gusher who says, "You were right about radio parts being hard to get. I had a tough time finding copper tubing for those coils."

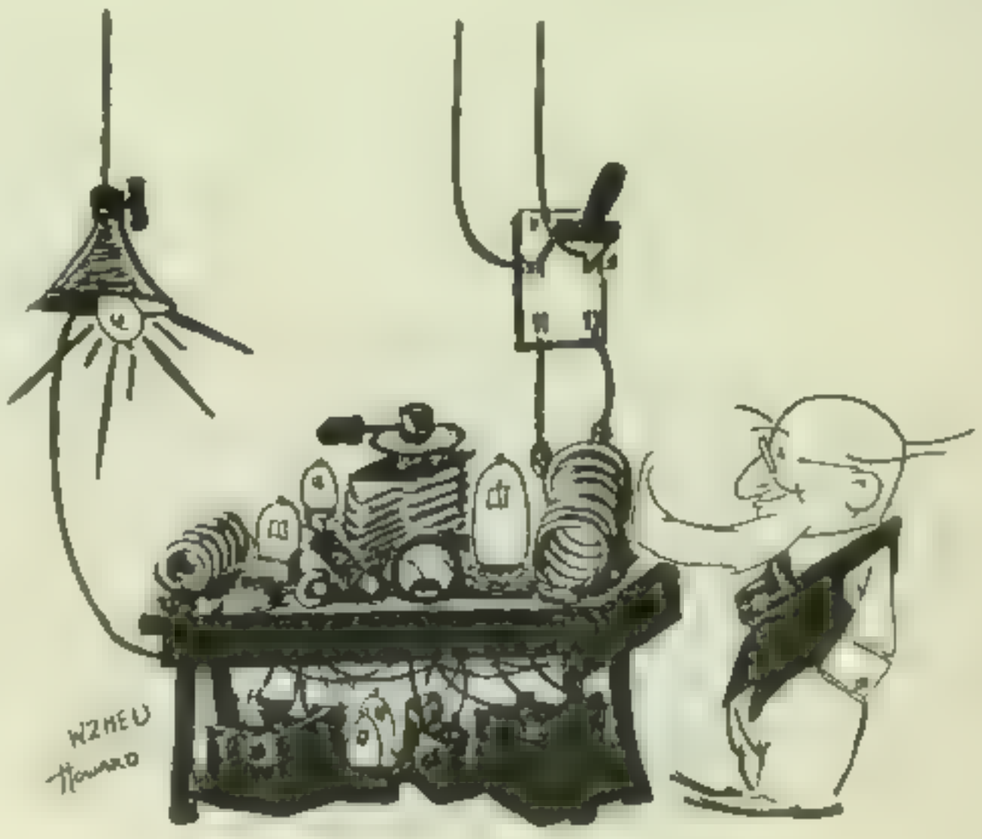
I slap him on the back and say, "Alf, you did a good job. I'm proud of you."

Gusher looks sort of modest and says, "The book says it's one of the best transmitters there is."

"You stick to the book," I tell him, and before I start to choke I retreat to my own shack. I feel a bit like a heel for not telling him what the score is but after all, the guy can read and if he doesn't know what year it is it's not my fault.

The DX during the next week or two is really remarkable. I am on the air every chance I get

[*Continued on page 73*[



Official DX Country List

The DX men have been working a lot of post-war DX, and most of them have come up with the question, "What is a country?" Most of the lists of countries worked by the DX gang, no doubt, are pretty much in agreement, but, obviously, the post-war picture on country credit call for some changes. The last revised list of countries was in the latter part of 1939, and at that time, was standarized by collaborating with By Goodman of *QST*, and the R.S.G.B. The same procedure was followed with this post-war country list, and for several months, we have been collaborating with BY, and his five man DX committee, and G2MI, and his R.S.G.B. committee. At first, it was thought by some that we were going to have quite a struggle formulating a list, however, after the three committees went into action, most of the time was used in the exchange of correspondence with G2MI and W1DX. We were almost unanimous in our feelings on this country list, and feel it represents a good cross section of the DX man's opinion. Our committee, consisting of W6ENV, W6DI (ex-W6NNR), W6SA, and W6JBO, has been at work for some time getting a general reaction from various DX men, thus, helping a great deal in getting the country list compiled to the liking of the majority. East Coast members of the staff also carefully checked the list, and consulted with prominent DXers.

You will notice by going through the list, a number of countries have been added, and several have been deleted or combined. A few of the changes are: The Isle of Man has been deleted—it will count with England and any other users of the prefix "G"; Tasmania has been included with Australia; Federated and Non-federated Malay States and Straits Settlements are now grouped together under "Malaya"; Baluchistan counts as part of India now, but Sikkim has been added; Christmas Island, which is jointly controlled by the U. S. and Great Britain, had us confused for a while, but it was finally decided to group it with either Fanning Island (VR3) or Jarvis Island (KP6) depending on the prefix of the station in operation; Guam has now been combined under the Marianas Islands; Ryukyu (included Okinawa) has been added; Bonin and Volcano Islands, which includes Iwo Jima, was added; Gough Island combined with Tristan da Cunha; Nicobar combined with Andamans; Hedjaz combined with Saudi Arabia; and Socotra is combined with Aden.

We hope that most of you will agree with this country list, although, there's bound to be some differences of opinion. If at any time some of you have any suggestions or criticisms, we would like to hear of them. Whenever it becomes necessary to revise the list, the collaborators will again get together. It is hoped this list of post-war countries will help you compile your list of countries worked. Also included, is the zone number on the same line of the country, which should assist in compilation of your zone list.

Country	Prefix	Zone
Aden and Socotra Island	VS9	21, 37
Afghanistan	YA	21
Alaska	KL7	1
Albania	ZA	15
Aldabra Islands		39
Algeria	FA	33
Andaman Is. and Nicobar Is.		26
Andorra	PX	14
Anglo-Egyptian Sudan	ST	34
Angola	CR6	36
Argentima	LU	13
Ascension Island	ZD8	36
Australia (including Tasmania)	VK	29-30
Austria	OE	15
Azores Islands	CT2	14
Bahama Islands	VP7	8
Bahrein Island	VS8	21
Baker Island, Howland Island and Am. Phoenix Islands	KB6	31
Balearic Islands	EA6	14
Barbados	VP6	8
Basutoland	ZS4	38
Bechuanaland		38
Belgian Congo	OQ	36
Belgium	ON	14
Bermuda Islands	VP9	5
Bhutan		22
Bolivia	CP	10
Bonin Islands and Volcano Islands (e.g., Iwo Jima)		27
Borneo, British North	VS4	28
Borneo, Netherlands	PK5	28
Brazil	PY	11
British Honduras	VP1	7
Brunei	VS5	28
Bulgaria	LZ	20
Burma	XZ	26
Cameroons, French	FE8	36
Canada	VE	1 to 5
Canal Zone	KZ5	7
Canary Islands	EA8	33
Cape Verde Islands	CR4	35
Caroline Islands		27
Cayman Islands	VP5	8
Celebes and Molucca Islands	PK6	28
Ceylon	VS7	22
Chagos Islands	VQ8	39
Channel Islands	GC	14
Chile	CE	12
China	XU, C	23-24
Christmas Island	ZC3	31
Clipperton Island		7
Cocos Island	TI	7
Cocos Islands	ZC2	29
Colombia	HK	9
Comoro Islands		39
Cook Islands	ZK1	32
Corsica		15

Country	Prefix	Zone
Costa Rica	TI	7
Crete	SV	20
Cuba	CM-CO	8
Cyprus	ZC4	20
Czechoslovakia	OK	15
Denmark	OZ	14
Dodecanese Islands (e.g., Rho les)	SV5	20
Dominican Republic	HI	8
Easter Island		12
Ecuador	HC	10
Egypt	SU	34
Eire (Irish Free State)	EI	14
England	G	14
Eritrea	I6	37
Ethiopia	ET	37
Faeroes, The	OY	14
Falkland Islands	VP8	13
Fanning Island (Christmas Is.)	VR3	31
Fiji Islands	VR2	32
Finland	OH	15
Formosa (Taiwan)		24
France	F	14
French Equatorial Africa	FQ8	36
French India	FN	22
French Indo-China	FI8	26
French Oceania (e.g., Tahiti)	FO8	32
French West Africa	FF8	35
Fridjof Nansen Land (Franz Josef Land)		40
Galapagos Islands		10
Gambia	ZD3	35
Germany	D	14
Gibraltar	ZB2	14
Gilbert & Ellice Islands and Ocean Island	VR1	31
Goa (Portuguese India)	CR8	22
Gold Coast (and Brit. Togoland)	ZD4	35
Greece	SV	20
Greenland	OX	40
Guadeloupe	FG8	8
Guantanamo Bay	NY4	8
Guatemala	TG	7
Guiana, British	VP3	9
Guiana, Netherlands (Surinam)	PZ	9
Guiana, French, and Inini	FY8	9
Guinea, Portuguese	CR5	35
Guinea, Spanish		36
Haiti	HH	8
Hawaiian Islands	KH6	31
Honduras	HR	7
Hong Kong	VS6	24
Hungary	HA	15
Iceland	TF	40
Ifni		33
India	VU	22
Iran	EP-EQ	21
Iraq	YI	21
Ireland, Northern	GI	14
Italy	I	15
Jamaica	VP5	8
Jan Mayen Island		40
Japan	J	25
Jarvis Island, Palmyra group (Christmas Island)	KP6	31
Java	PK1-2-3	28
Johnston Island	KJ6	31
Kenya	VQ4	37
Kerguelen Islands		39
Korea		25
Kuwait		21
Laccadive Islands	VU4	22
Leeward Islands	VP2	8
Liberia	EL	35

Country	Prefix	Zone
Libya	(LI)	34
Liechtenstein	HE1	14
Little America	KC4	13
Luxembourg	LX	14
Macau	CR9	24
Madagascar	FB8	39
Madeira Islands	CT3	33
Malaya	VS1, VS2	28
Maldive Islands	VS9	22
Malta	ZB1	15
Manchukuo		24
Marianas Islands, (e.g. Guam, Tinian, Saipan)	KG6	27
Marshall Islands		31
Martinique	FM8	8
Mauritius	VQ8	39
Mexico	XE	6
Midway Island	KM6	31
Miquelon and St. Pierre Islands	FP8	5
Monaco		14
Mongolia		23
Morocco, French	CN	33
Morocco, Spanish	EA9	33
Mozambique	CR7	37
Nepal		22
Netherlands	PA	14
Netherlands West Indies	PJ	9
New Caledonia	FK8	32
Newfoundland and Labrador	VO	5, 2
New Guinea, Netherlands	PK6	28
New Guinea, Territory of	VK9	28
New Hebrides	FU8	32
New Zealand	ZL	32
Nicaragua	YN	7
Nigeria	ZD2	35
Niue	ZK2	32
Norway	LA	14
Nyasaland	ZD6	37
Oman		21
Palau (Pelew) Islands		27
Palestine	ZC6	20
Panama	HP	7
Papua Territory	VK4	28
Paraguay	ZP	11
Peru	OA	10
Philippine Islands	KA	27
Phoenix Islands (British)		31
Pitcairn Island	VR6	32
Poland	SP	15
Portugal	CT	14
Principe and Sao Thome Islands		36
Puerto Rico	KP4	8
Reunion Island	FR8	39
Rhodesia, Northern	VQ2	36
Rhodesia, Southern	ZE	38
Rio de Oro		33
Roumania	YR	20
Ryukyu Islands (e.g., Okinawa)	J9	25
St. Helena	ZD7	36
Salvador	YS	7
Samoa, American	KS6	32
Samoa, Western	ZM	32
Sarawak	VS5	20
Sardinia		15
Saudi Arabia (Hedjaz and Nejd)	HZ	21
Scotland	GM	14
Seychelles	VQ9	39
Siam	HS	26
Sierra Leone	ZD1	35
Sikkim	(AC3)	22
Solomon Islands	VR4	28
Somaliland, British	VQ6	37

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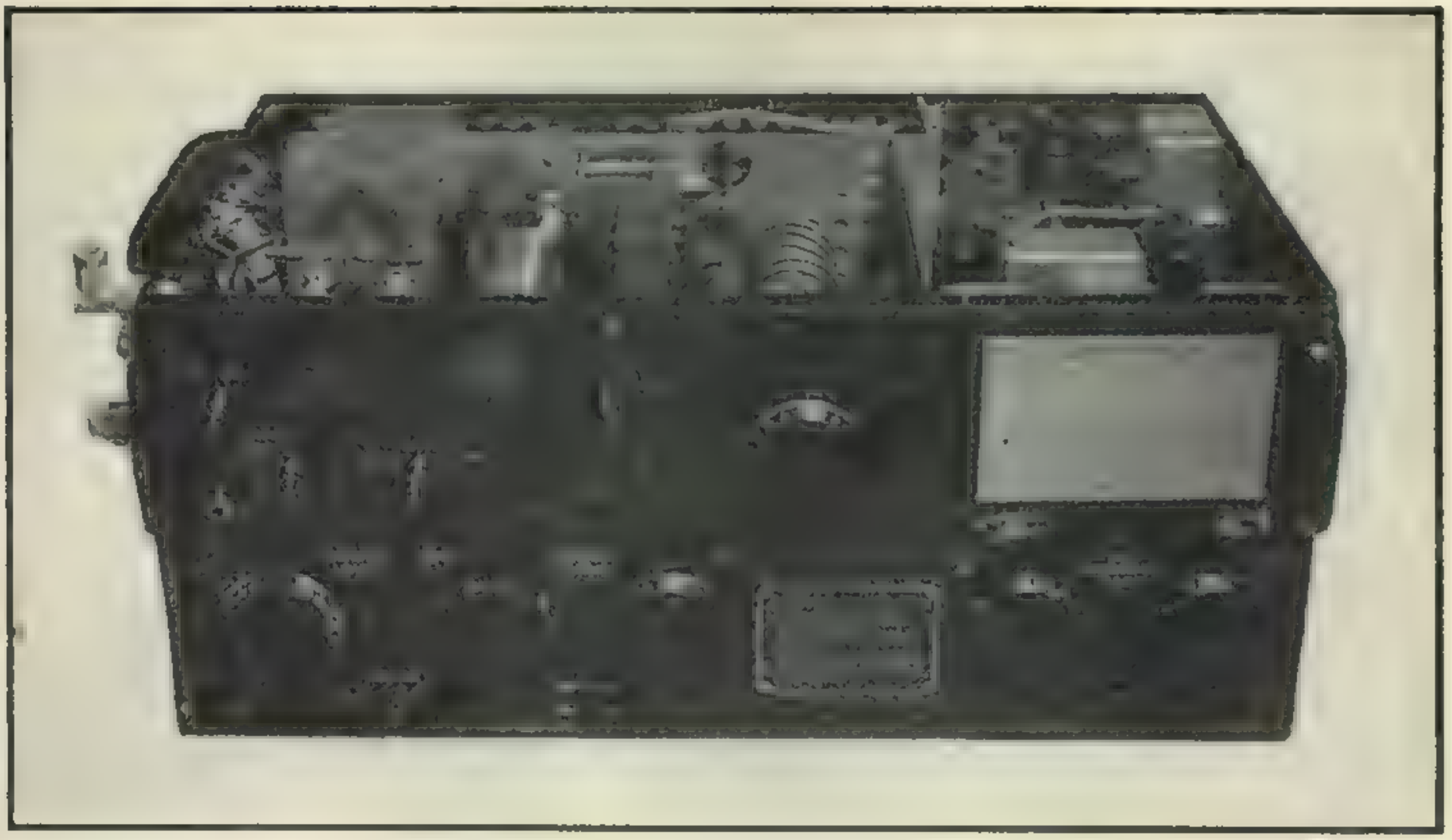


The Collins Autotune AN/ART/13. This model, after conversion, has two additional controls, the high frequency tank condenser dial and the variable antenna link control, located just above the nameplate.

Another Method of Converting the ART/13

R. D. VALENTINE, W2GX* and ATHAN COSMAS, W2PKD**

In the November, 1946 issue of CQ, Paul Rafford, W2GQM, described a method of converting the very popular ART/13 transmitter to amateur use. In the light of the experience of these two writers, the *Rafford* method may be simplified by designing a suitable 10-11 meter tank coil and pruning the coils of the master oscillator in such a fashion that the output frequency range extends from 3.4 to 30.6 mc, instead of the original range from 2.0 to 18.1 mc. Although this destroys the frequency calibration as supplied with the ART/13, the transmitter may be easily recalibrated with the aid of a communications receiver and the *CFI* unit built into the ART/13.

Description of the ART/13

The AN/ART/13 or ATC/1 uses an 837 v.f.o. operating between 1000 kc and 1510 kc in two ranges: 1000 to 1200 kc and 1200 to 1510 kc. The band of oscillator frequencies available depends upon the position of the oscillator range switch *S101*, which adds or removes padders to the tuned circuit of the fundamental oscillator.

Photos by R. Cobaugh, W2DTE.

*201-15 88th St., Bayside, N. Y.
**72-50 Kessel Av., Forest Hills, N. Y.

The output of the v.f.o. must be multiplied from two to twelve times to cover the frequency range desired. This is accomplished in two 1625 multiplier stages. The first 1625 operates as a doubler, tripler, or quadrupler; the second 1625 operates only as a tripler. The first multiplier is controlled by switch *S102;* the second by switch *S103*. The positions of *S101*, *S102*, and *S103* are governed by the *A* control on the front panel.

The inductance *L101* in the v.f.o. and the two inductances in the multipliers, *L105* and *L106*, are slug-tuned. The slugs are ganged for simultaneous fine frequency adjustment and are controlled by dial *B* on the front panel.

An 813 is used in the final amplifier and functions at all frequencies as a straight amplifier. From positions 1 to 6 inclusive (2.0 to 6.0 mc) on the *A* control, the output of the first 1625 multiplier is connected to the grid of the 813. In position 7 to 12 (6.0 to 18.1 mc) of the *A* control, the output of the first multiplier drives the second multiplier which in turn feeds the 813 final. The output circuit of the 813 consists of controls *C*, *D* and *E* that are handled from the front panel and constitute the Collins Antenna Network. In positions 1 to 7 inclusive of the *C* control, the

antenna tuning circuit functions as an *L* network. From positions 8 to 12 the antenna is loaded by a pi-network, while in position 13 the tuner again becomes an L network, but with a small inductor *L114* in shunt with the variometer controlled by *D*.

Converting to Amateur Operation

Since the frequency range below 3.5 mc is just so much waste in the ART/13, it was decided to prune the coils in the oscillator to permit 10-meter operation without the addition of another doubler stage as suggested by Rafford. In order to make the coil changes it is necessary to remove the right side wrap-around panel of the transmitter case. This is accomplished by taking out seven screws in the rear and ten screws at the side of the case. This exposes an aluminum shield that covers the housing of the h-f oscillator coil. This must also be removed. When this is done the multiplier inductances *L105* and *L106* and the oscillator inductance *L101* are exposed to view.

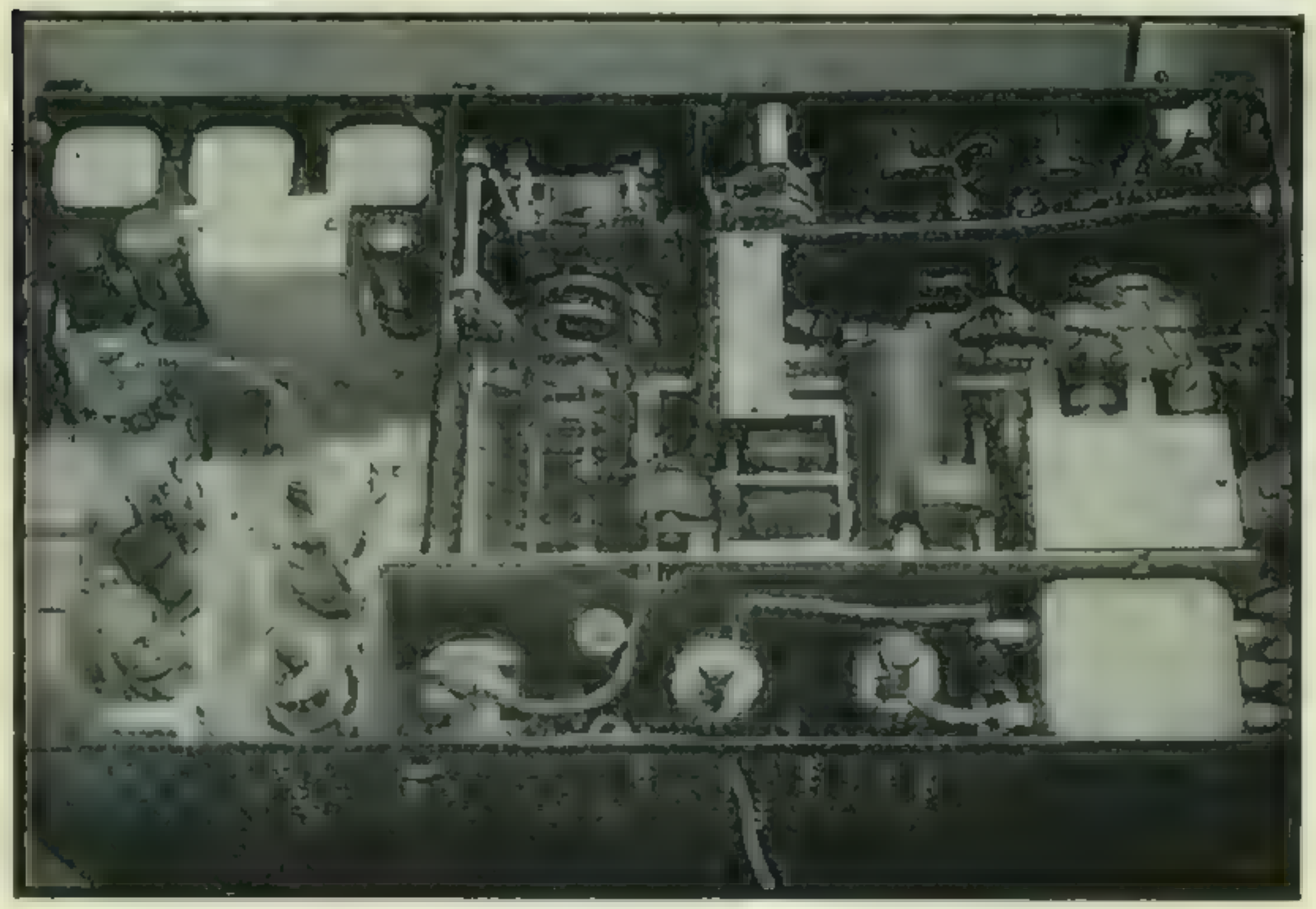
It will be noted that all three coils are wound with a few turns close-wound at one end, a section of widely spaced turns followed by a long section of close-wound turns. The reason for this unconventional method of winding is to obtain a nearly straight-line-frequency calibration for the *B* control. The terminal at the end of the long section of the winding is the cold r-f end. Approximately 40 per cent of the winding is removed from each coil, beginning at the cold r-f terminal.

The oscillator coil *L101* has originally 47 turns and 28 are removed. The first multiplier coil *L105* has 28 turns originally, of which 16 are removed. The second multiplier coil *L106* has 9 turns and 5 are removed. These turns may be carefully removed without disturbing the coil forms. It is neither necessary nor advisable to remove the complete coils in order to make the changes. When the correct number of turns have been removed, re-solder the end to the terminal lug.

In extending the frequency range of the transmitter, it is necessary to substitute another tank circuit for the 813 when operating the 10-meter band. Position 13 could not be used for this purpose since a cam-operated switch on the shaft of the *A* control disables the oscillator and the multiplier stages by opening their respective cathode resistor connections. However, it is possible to retain completely automatic 10-meter operation by re-positioning the cam and the connections of the two jumpers on switch *S114*. When this is done the oscillator and the multipliers follow through normally and at the same time the relay *K105* functions to substitute the h-f tank circuit for the Collins network.

In order to make these changes it will be necessary to remove the frequency multiplier unit from the assembly. The following procedure is recommended:

1. Remove tubes and remove the autotune cover plate and bottom plate.
2. Remove autotune unit *A*. This is done by turning the dial locking bar to the unlocked position and unloosening the two No. 10 Bristol set screws in the dial. Then turn the dial and locking bar counterclockwise together until the bar comes free. Remove the dial and locking bar, then remove the dial back plate by loosening the two long screws on the top end of the unit and the short screws on the bottom end of the unit.
3. Lift the autotune unit out, being very careful not to move any of the mechanisms from



Top view of the ART/13 showing placement of parts for the high frequency tank.

the time the unit is loosened until it is again securely in place.

4. Remove the screws holding the seeking switch *S109* to the casting and swing out the switch.
5. Remove the wires leading to the multiplier coils at the rear of the h-f oscillator unit. Remove the buss wire connected to the coupling condenser *C116*.
6. Remove the two screws just behind the second multiplier clamp shell and the two screws just in front of the multiplier clamp shell. This multiplier may now be pulled out sufficiently to remove the nut holding the ground wire lug on the fire-wall assembly. Remove the cable connector *J115* from *P101* in the multiplier unit. The multiplier unit may now be lifted out of the transmitter completely.

It is now possible to move the cam that actuates switch *S114* from its normal position of closing the switch on position 13 to its new position of closing on 12. By reference to the wiring diagram it will be seen that *R130* and *R131* must be kept in the circuit. This is done by placing jumpers across the controlling contacts of *S114*. With these changes completed, the multiplier unit may now be re-installed.

The relay *K105* may be operated manually by a SPST switch shown in *Fig. 1*. With the SPST switch closed, all 11 channels may be set for automatic operation 11 and 10 – or a combination, with the low frequencies available by opening the SPST switch may be set up.

High Frequency Tank Circuit

The next step is to install the new tank coil circuit for the 813 final amplifier. The unit is a conventional one and with the *Bud JC-1540* tuning condenser it will adequately cover the 10 and 11-meter bands. The following procedure is recommended for this installation.

1. Remove all tubes, the leads from *C118*, and finally *C118* itself.
2. Cut the four connections at the terminals of *L109*. Remove the two *L109* tinned wires that connect to relay *K105*. Remove *L109* and install a one-inch standoff insulator in the *L109* mounting hole.
3. Put solder lugs on the heavy insulated wire that carries the B+ and on the No. 10 tinned wire that carries the B+ to the 813. Place lugs under screw at the standoff.
4. Remove the tinned wire between the *Loading Coil* binding post and *K105*. The standoff insulator supporting this wire can be used in step *2* above. The terminal on *K105* will be used for the plate circuit of the 10-meter tank.

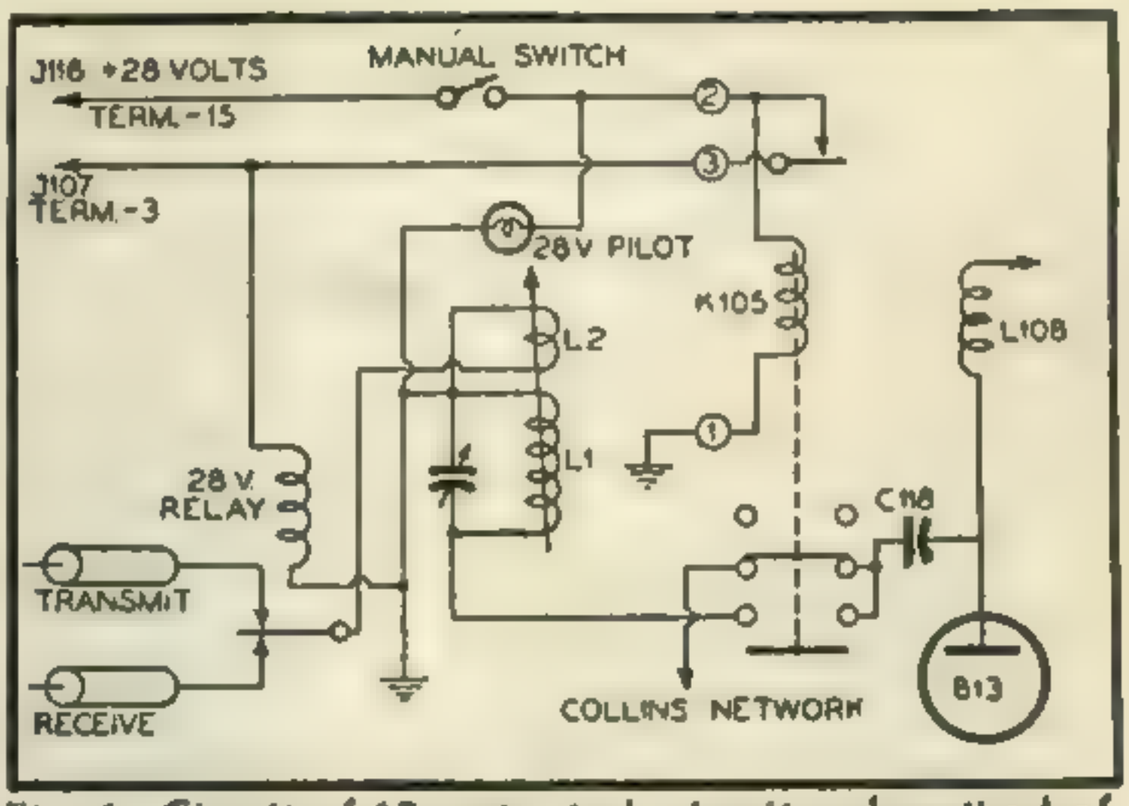


Fig. 1. Circuit of 10-meter tank circuit and method of wiring into transmitter. The variable condenser across *L1* is single section, 50 μμf, Bud JC-1540 or equivalent. *L1* is 5 turns of ⅛" copper tubing 1½" i.d. *L2* is 2 turns of No. 10 wire.

5. Remove the wire from the *Condenser* binding post to the vacuum keying relay. It is necessary to be extremely careful with the keying relay leads as they require a small Bristol wrench.
6. Remove the solder lug from the *Receiver* binding post and solder it to the *Condenser* binding post. The two binding posts on the ceramic bowl now serve as transmit and receive antenna connections for all low frequency positions.
7. Remove the *Receiver* and *Load Coil* binding posts and install two coax feed-thru connectors. These will serve as transmit and receive antenna connections for all h-f positions.
8. Remove the *Low Frequency* front panel and install the 28-volt antenna changeover relay, 10-meter coil and condenser unit. See *Fig. 2* for the suggested positioning.
9. If manual operation is to be used, it will be necessary to install a SPST switch and pilot light and remove and tape the end of wire from terminal *2* of the *K105* holding coil. Replace panel and complete wiring. Substitute a +28 volt lead from terminal #15 *J116* to terminal 2 on *K105*, as shown in *Fig. 1*.

Oscillator Recalibration

After the wiring changes have been made it is necessary to replace the shield cover, the wrap-around cover and the tubes. The condensers for tuning the multiplier stages are accessible from the bottom of the transmitter. To check for oscillation, remove the high voltage fuse and apply the filament voltage. Set *A* control to position one and the *B* control to midscale. With the power level switch at *Tune* and the emission switch at *CW* apply the low voltage to the oscil-

[*Continued on page 66*]

Inside the SHACK AND WORKSHOP

Conducted by A. DAVID MIDDELTON, W1CA

Here are some of the first products of those ham gadgeteers and workshop experts. We hope that the boys can benefit from all this ham "savvy". Anyway we hope you'll all pass along your ideas. Don't worry about literary form—just get your ideas down on paper and include rough sketches, diagrams or photos if you have them; Mid will whip them into shape for publication. Be sure to put your full name, call and QTH on as many items as you choose to submit so that we can send along two crisp new dollars for each one published.

Address all contributions to: S & W Department % CQ, 342 Madison Ave., N. Y. 17, New York.

"Tube Hammer" for the Hamshack

Here is a tube hammer that will come in handy around any hamshack. All that is needed is a cork stopple (about the size that will fit a gallon jug), a wooden dowel rod about ¼ inch in diameter and six to eight inches long and a bit of glue.

Select a twist drill that will make a snug fit for the dowel rod on hand and drill a hole half-way thru the cork stopple. Coat the inside of the cork and the tip of the dowel with glue and place the dowel in the hole in the cork. Allow this combination to dry thoroughly before using.

There you have a hammer that can be used to beat on a tube as hard as you desire, and you will not break the tube—or burn a finger.

Milton Kalashian, W1NXT.

Clamp for Telescopic Elements

An improved clamp for holding telescopic beam elements can be fabricated directly on the end of the main element in a method suggested by W2LMH.

As shown in Fig. *1*, the element is slit for a distance of two or more inches, cut half-way through, and the tabs bent outward until they are tangent to the

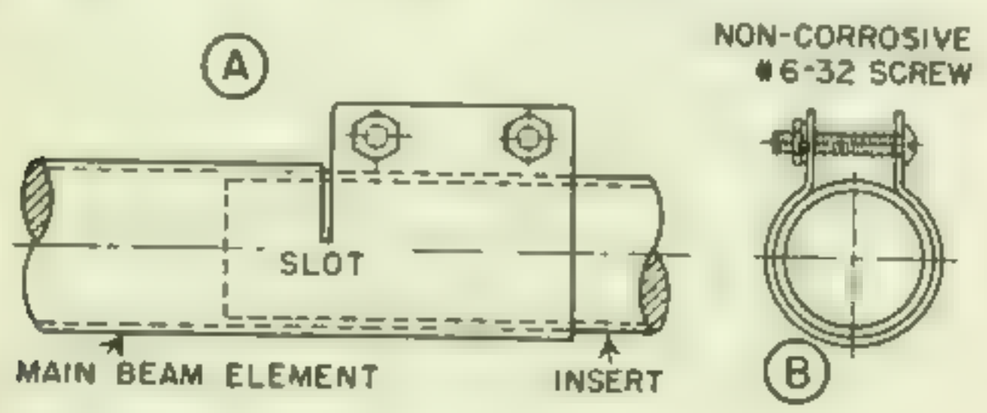


Figure 1

periphery of the tubing. The slot cut across the tubing provides the proper tightening action. Holes are drilled in both tabs and small machine screws and nuts clamp the insert tightly.

If the main beam element is made of suitable material the holding nuts may be soldered or brazed directly to the tabs. However, if the beam is of unsolderable material, elastic stop nuts could be used to advantage. Ordinary nuts should be backed with rustproof lockwashers.

The clamping section can be made as long as desired. The inserted element slides back into the main element and the clamp merely holds it in place. The strain is placed on the main element and not on the clamp.

Bill Karsten, W2LMH.

V. F. O. Frequency Indicator

A v.f.o. is a wonderful device. One little fly in the ointment is the fact that even the best of v.f.o.s will drift to some extent and there is the ever-present possibility that the frequency will be outside the band.

W3KHJ uses the calibrator-indicator shown in Fig. *2* to check the ends and inside spots in the

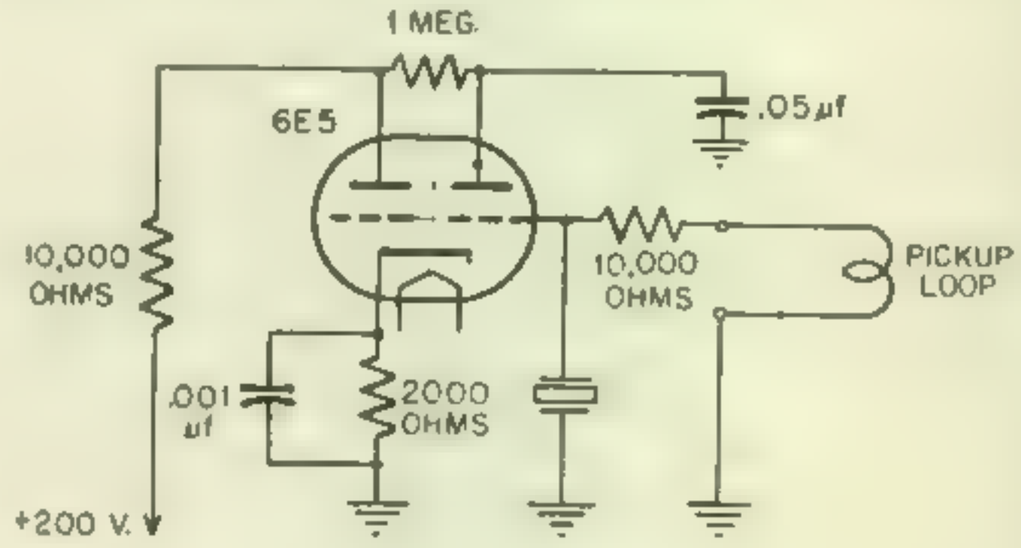


Figure 2

bands. This idea of using crystals for such a purpose is neither original or new but may be of interest to those seeking a way to check their v.f.o.s without trouble.

A 6E5 is connected as a grounded-plate crystal oscillator with a small amount of the transmitter signal fed into the grid by a pick-up loop. This coil may be coupled to the final tank or any intermediate stage (where the signal frequency is the same as the crystal used in the indicator). These two signals mix in the triode section of the 6E5 and close the "eye" when both signals are on the same frequency. Coupling of the pick-up loop should be adjusted until the eye just closes with no overlap. This will occur when the grid is about eight volts negative.

Plug-in crystals may be used, but a switching arrangement will prove more advantageous where calibration is desired for several spots.

"Fundamental type" crystals should be used in this indicator-calibrator as "harmonic" types will not function properly.

Edward B. McIntyre, W3KHJ.

Light-Bulb Power Measurements

What is the efficiency of your final? How much power do you actually put into your antenna? Why not measure the output of your final amplifier! You need only an r-f ammeter or a milliammeter, a 115-volt light bulb of the proper size, an

ohmmeter, and a few assorted condensers—and some patience.

While these circuits do not give extremely accurate results, they will serve to give a much better idea of the performance of your transmitter than a look at the light bulb, followed by a guess as to its brillancy and power input.

The idea behind this method of measuring power is to measure—*simultaneously*, the r-f current flowing through a light bulb and its d-c resistance. Using the formula $P = I^2R$ (in watts, amperes and ohms) the actual power input is known.

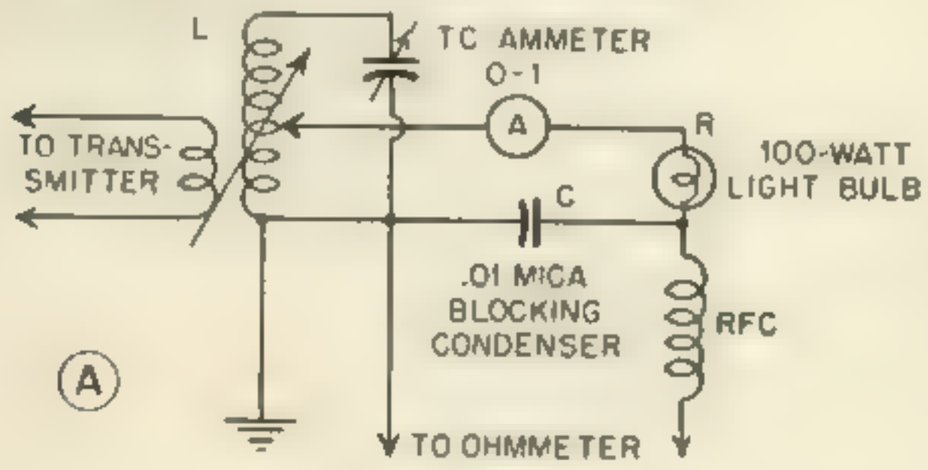


Figure 3a

A d-c ohmmeter must be used as the resistance of a light bulb filament increases very rapidly with the filament temperature, so that a resistance reading, taken with the bulb cold, is useless. For example, a 15-watt bulb has a cold d-c resistance of about 100 ohms but a hot resistance of about 960 ohms.

A simple r-f power measuring system is shown in Fig. *3A*. The r-f current being measured flows through the blocking condenser, *C*, while the d-c filament resistance is measured directly across the blocking condenser, using an ordinary ohmmeter. The r.f.c. and the by-pass condenser are precautions to keep the r.f. out of the ohmmeter. If the ohmmeter is adjusted to zero when a temporary short-circuit is placed across the blocking condenser, the resistance of the r.f.c. will be taken care of automatically.

Fig. *3B* depicts an actual set-up made when no ohmmeter was available. A O-15 d-c milliammeter and a flashlight were substituted for the ohmmeter. A 150-ohm resistor protects the meter while the bulb is cold. After the tuning and loading adjustments are made to the link and tank circuit, *L*, the switch is closed, shorting the resistor. The battery voltage should be measured frequently.

The resistance of the light bulb may then be computed from the milliammeter reading and the battery voltage using the formula $R = E/I$. Then the r-f power may be calculated using the TCA reading and the "hot" bulb resistance, with formula $P = I^2R$.

For very low-resistance loads, such as a 500- or a

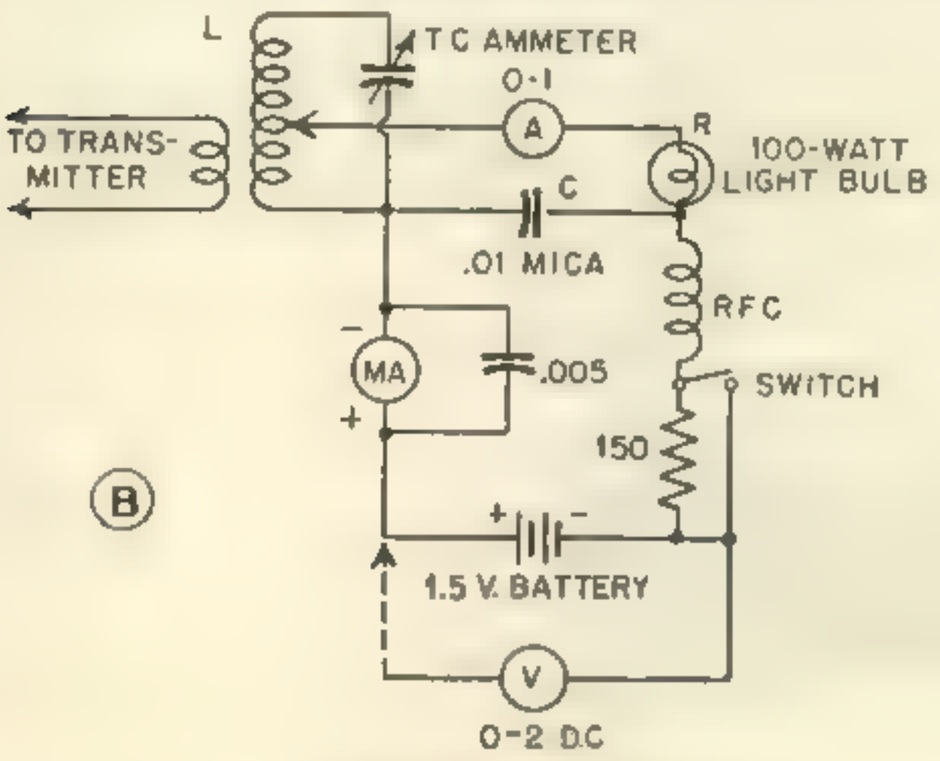


Figure 3b

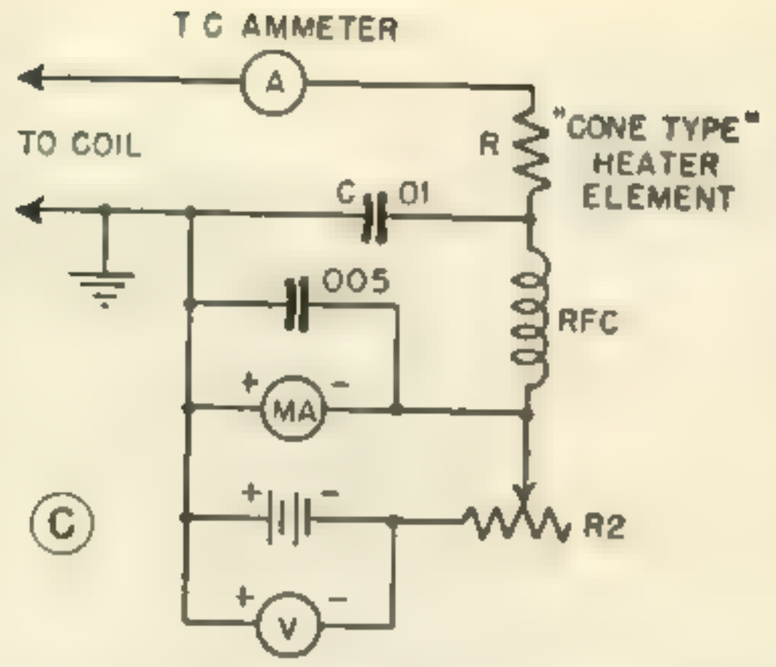


Figure 3c

1000-watt heater element, the parallel ohmmeter circuit of Fig. *3C* must be used. The condenser, *C*, should be shorted out and the meter calibrated using low-ohm resistors of known value, at *R2*.

Henry L. Cox, Jr. W8UPS

Ham Anvil

Here is an anvil that will make easy work out of the job of chiseling holes in a chassis or plate. This heavy-duty steel table will come in handy around any hamshack or workshop.

While the anvil can be made in your own workshop it requires tools not normally found in most stations. It might be well to visit your local machine shop or the village blacksmith might be called to make this gadget for you. In any event, if

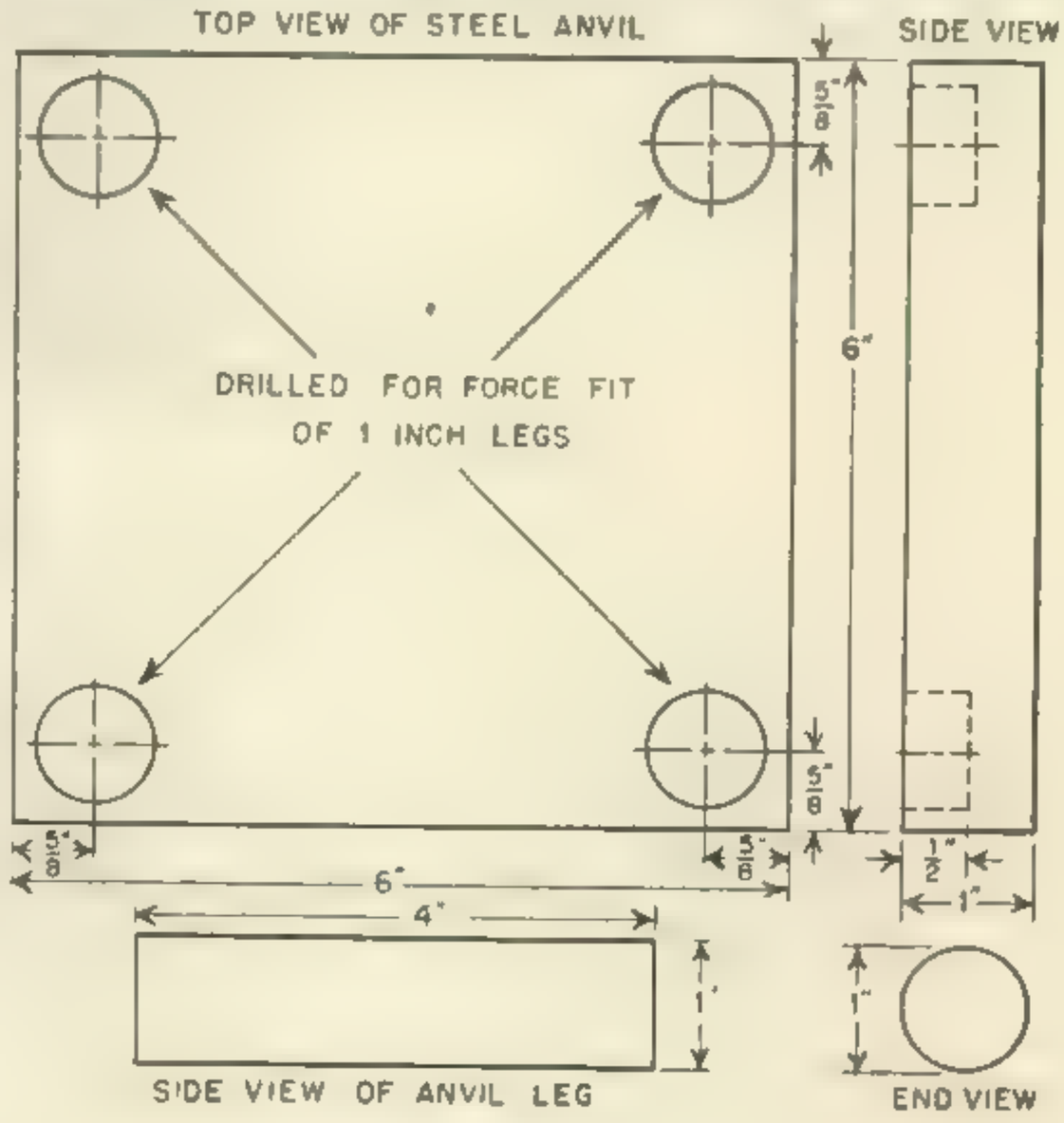


Figure 4

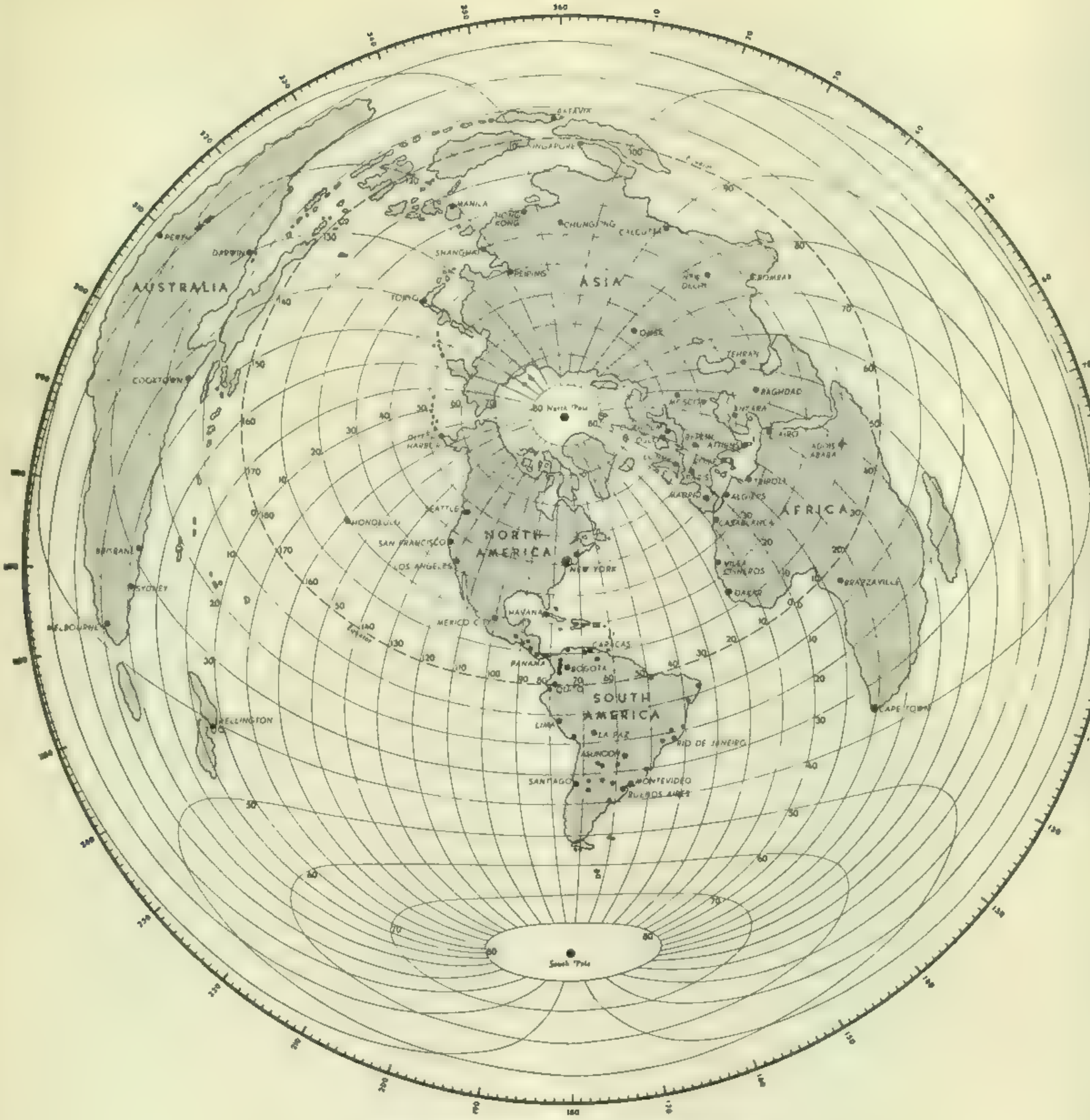
you can scrounge the metal somewhere you should not be out so much actual cash.

I made my anvil so that it would fit inside a 7 x 7 inch chassis. The top is 6 x 6 x 1 and the legs fit inside the edge by about ⅛th inch. The legs are four inches long and are set into the top by one-half inch. This gives a 4½-inch table height, sufficient to clear a three-inch chassis satisfactorily.

The legs were driven into the undersized 1" holes and the force fit holds them in place.

This anvil can be moved around under a chassis into any position where it is necessary to cut a hole. In cutting a plate, it should be fastened to the anvil with a C-clamp.

Milton Kalashian, W1NXT.



STATUTE MILES (on straight line through or from NEW YORK only)

1000 2000 3000 4000 5000 6000 7000 8000 9000

GREAT CIRCLE MAP OF THE WORLD

Centered on New York City

The great circle distance from New York City to any other point on the surface of the globe may be scaled off directly on this map, using a straight-edge and the scale of miles shown directly below the map. For example, Dakar scales roughly 3600 miles from New York City. Distances of points from other cities in the Eastern United States can also be scaled off directly with sufficient accuracy for most purposes To determine distance in kilometers multiply miles by 1.6.

The great circle direction of any point from New York City may be determined by laying a straight-edge from New York City to the point whose direction it is desired to determine. The point at which the straight-edge crosses the numbered circle will give the direction. Thus, Calcutta, India, lies about 18 degrees north northeast from New York City This is the third in a series of great circle maps of the world to be presented. *(Reproduced by permission of Columbia Broadcasting System, Inc.)*

Training them young is the idea of W2IOP. His little girl Patricia Joan, who at the tender age of 18 months is busy tuning for the DX on the SX-42, should make some ham's ideal XYL in another twenty years or so.

DEPARTMENTS

- *Monthly DX Predictions*
- *CQ DX*
- *V. H. F.-U. H. F.*
- *The YL's Frequency*
- *Parts and Products*
- *Postscripts*
- *Announcements*

Monthly DX Predictions - - FEBRUARY

OLIVER PERRY FERRELL*

Comments and Problems

Comments from the users of the Band Predictions are invited and are of interest to CQ and to the IRPL. If you have some transmission problem directly involving conditions for DX-ing or want to know what would be the best average hours for working a certain city from your location you are invited to write to the Propagation Editor, CQ Magazine, 342 Madison Ave., New York 17, N. Y. Please enclose either a penny postal or a stamped self-addressed envelope for reply. Allow 7 to 10 days for reply.

WE HAVE BEEN receiving from time to time many welcomed letters of constructive criticism of the *Monthly DX Predictions*. One of the most frequent suggestions is for a revised form of the charts. Basically, the ideal chart, for the amateurs would indicate just what conditions should be expected on each band for each hour of the day. At the present time this does not appear possible with the techniques we are now employing.

The basic predictions are prepared by the Central Radio Propagation Laboratory and must systematically present information of magnitude (MUF) time of occurrence and geographic location. As indicated in our previous columns the structure of the ionosphere is not constant with geographic latitude and must therefore be analyzed in terms of a frequency and spatial distribution vs. a time series. The CPRL series accomplish this objective with a world map, a celluloid overlay, a great-circle chart and three iso-ionic base charts. The structure of the ionosphere and the distance and direction by the great-circle route require that for predicted communications between any two points, a separate base chart, similar to those appearing monthly in *CQ*, is necessary. This may be illustrated by calculating DX conditions for a path equal in latitude to New York City and Recife, Brazil. The MUF would be 39.0 mc., however for a path from Rome, Italy to Leopoldville, Belgium Congo the MUF would be 48.0 mc.

The present charts do more than predict band opening and closing times on certain paths. By illustrating the full extension of the MUF outline, a comparative aspect with previous months may be assumed. The peak MUF, in the case of 10 meters corresponds to the peak conditions on that band and in the case of 20 and 40 meters the MUF corresponds to the poorest conditions with maximum signal absorption.

This month a small notation is carried with each chart. This note indicates the azimuth from the point within the United States that the path is drawn. This has become necessary because of the evident possibilities of working DX *the other way around*, which would result in the predicted graphs being inaccurate. The indicated azimuths are based on graph circle considerations from the midpoints of the East Coast and West Coast areas.

Assistant Editor

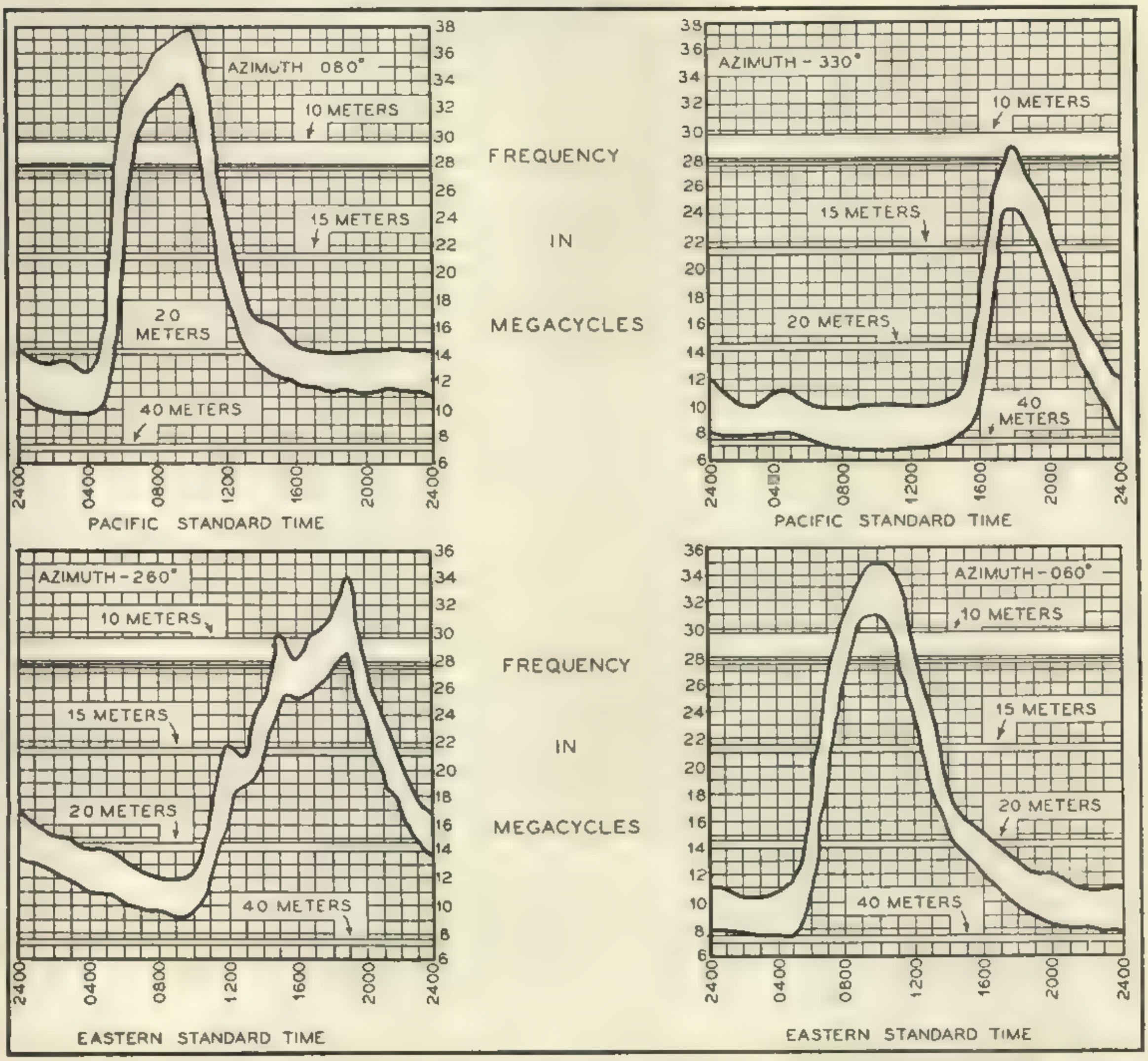
In *Fig. 1* the average conditions for a general path from the West Coast of the United States to South and Middle Africa are illustrated. Following the upper outline, or the maximum usable frequency (MUF) a sharp 10 meter opening is indicated when the line crosses the 10 meter band at about 0630 hours PST. Peak conditions are expected around 1100 hours PST with a 10 meter band closing after 1230 hours PST. 20 meter conditions are erratic with the best opening near 0600 PST and 1230 to 1400 PST. In the last week of February a noticeable improvement in conditions will occur with a much stronger 10 meter opening (an MUF of 39.0 mc is expected). Predicted conditions for the west coast to the area about Eastern India, Ceylon and Burma are illustrated in *Fig. 2*. Although a positive 10 meter opening is not expected in the early part of February, a gradual improvement in conditions should result in a good opening around 1730 hours PST by the first week of March. 20 meters should be best after 2000 hours PST with an extension of this opening until 2130 hours by the last week of February.

Erratic conditions are expected on the Eastern United States to Australia and New Zealand path. The first significant 10 meter opening is expected around 1500 hours EST. This short peak, illustrated in *Fig. 3* is not expected to exceed 30.0 mc during the first two weeks of February. A second and more consistent opening is predicted by the MUF outline starting at 1630 hours EST. Peak conditions in the early part of February with an MUF of 34.0 mc at 1900 hours EST. During the last two weeks the afternoon *dropout* at 1600 hours will be replaced with a general overall opening on 10 meters from about 1400 hours to 2030 hours EST. It will be noted that conditions on this path will steadily improve this month with longer openings and extending for 10 meters until well after the East coast sunset. The general 20 meter trend is also shown in *Fig. 3*. With particular emphasis on the early morning hours. An upward extension of the MUF curve by about four megacycles would give some indication of the general conditions expected in mid-March.

During the month of February the 10 meter band opening time for the general path from the eastern part of the United States to the Mediterranean area is expected to progress from 0730 hours EST around the first of February to about 0645 hours EST at the end of the month. This is illustrated in *Fig. 4*. The progression of the 10 meter opening times indicates that another peak in F, layer MUF is being approached. This should be reached in mid-March. During February peak 10 meter conditions will be about 1000 hours EST with an MUF of 34.0 mc. Toward the later portion of the month and partially into the month of March this peak will broaden out around 37.0 mc. 20 meter conditions will be fair around sunrise or 0630 hours EST and after 1400 EST till closing on this band at about 1700 hours EST.

The average February conditions from the United States to South America which are not shown this month will continue to be good. An MUF of 40.0 mc is expected around 1600 hours EST for the east coast with a 41.0 mc MUF for the west coast at 1515 hours PST.

The basic predictions of DX conditions are made through the use of the Central Radio Propagation Laboratory D series. Complete monthly information may be obtained by subscribing to the CRPL publications through the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.



Predicted DX conditions for February over various long transmission paths. The outer edge of the resultant variable is the maximum usable frequency and the inner edge is the optimum working frequency. Fig. 1. (top, left). West Coast of United States to South Africa. Fig. 2. (top, right). West Coast of United States to India, Ceylon and Burma. Fig. 3. (bottom, left). Eastern Coast of United States to Australia. Fig. 4. (bottom, right). Eastern Coast of United States to Eastern Mediterranean area.

Not only is KG6AAF nice DX, but it is operated by Major General F. H. "Butch" Griswold, commanding general of the 20th air force. KG6AAF is on 20 meter phone, approximately 14240 kc. Its the guardhouse if you don't QSL!

— • • • —

W3NCJ suggests that bug experts try these on their instrument:

TO OM OTTO TOM TOO
SHE HISSES SHE IS HIS

— • • • —

This is the story of an electric lamp with a charmed life. A repairman examining a 100-watt signal lamp on a radio tower in Roswell, N. M., after the tower was struck twice by lightning, accidentally dropped it 180 feet to the ground. The lamp survived the fall, as well as the lightning. Just like our neon bulbs.

— • • • —

A power company reports that damage by woodpeckers makes necessary the replacement of at least 100 of its poles each year. They have no record of replacements necessitated by rotary beam.s

— • • • —

The U. S. Army's mathematical robot, Electronic Numerical Integrator and Computer, has 18,000 electronic tubes, compared with 400 in the largest radar set and fewer than 800 in a B-29.

CQ DX

By HERB BECKER, W6QD

[*Send all contributions to Herb Becker, 1406 South Grand Ave., Los Angeles 15, Calif.*]

ZONE AND COUNTRY HONOR ROLL

To enter the Honor Roll it will be necessary to submit a list of Zones and countries worked. We are not asking you to send in your confirmations but suggest you do not count any Zone or country until you are sure the station is genuine. We reserve the right to exclude any stations on your lists which are known to be pirates. We will, however, require confirmations from those who are eligible for the W.A.Z. certificate.

Your Zone and country lists, both "postwar" and "all-time", must be compiled in accordance with the new postwar Official Country List. It is recognized that some of the old-timers will lose a country or two, e.g., Danzig, Saar, etc., but this should be offset by numerous additions now in the new country list.

Sequence in the Honor Roll will be determined by the number of postwar Zones worked. After the zone total will be the number of postwar countries worked. We will then show, on the same line, the "all-time" totals of zones and countries. No one can enter the Honor Roll with "pre-war" totals only.

The "C.W. and Phone" portion of the Honor Roll will contain the totals of those who operate both, while the "phone" column will contain totals of "Phone-to-Phone" only contacts.

Once your totals are entered and additional zones and countries are worked, simply submit the information on the new ones.

In order to facilitate our handling of the compilation of the Honor Roll we would like the lists from all to be somewhat standard in form. The information we require: (1) Call of Station worked, (2) country or (Zone), (3) date, (4) time.

In addition to this it will help to number the countries and zones so that totals may be easily recorded.

THIS MONTH brings forth the first post-war DX contest. If you haven't already seen the official country list, turn back a few pages and take a peek at it. Now then, this DX contest, as we see it, will be a battle royal. My reason for saying this is because there's hardly a DX man we hear from who doesn't have some unpleasant remark to make about the general abuse of v-f-o operation. It will never do any good for us to preach here on how we think you guys should run your band swishers. Sooner or later, each and everyone of us will be accused of plopping right on top of some elusive DX station, in spite of the fact that maybe we have just moved off one and unknowingly on top of another. It seems to me, however, it would help a little bit if we just followed the rule of not calling a DX station exactly zero-beat with him. This will leave the station in the clear, and, thus, will not be QRM'd by those who might still be calling him. It only takes one local station to mess up a DX station's frequency. If this one guy chooses to make a long call out of it, many times, the DX station has picked another one out of the mob to answer, and is well on his way through the transmission by the time the QRMing station decides to sign over. Anyway, I think if enough of us follow this practice, the idea might catch on with those who, as some fellows put it, "Don't know any better!" Some of the gang have been so irritated at the so-called abuse that they have been after us to publish a montly list of "DX Lids." Well, we hate this type of thing, and some way, somehow, I think it will straighten itself out. Even at this point, some foreign stations are picking up the idea of never working anyone exactly zero beat with him.

This reminds me of a little incident in a DX contest some years back when a little elusive foreign station, down South American way, caused plenty of head-scratching among the W's. Since he was the only station on the air in that country, all he had to do was to send QRZ once, after completing a contact, and the whole band would literally cave in on him. But did he work the station on his own frequency? Sometimes—yes, sometimes—no! And would he work the station who was on the same frequency of his previous contact? Sometimes—yes, sometimes—no! In other words, the W stations never knew where they stood. This guy would simply skip around the band picking any station where his dial happened to stop. This, of course, was rather disconcerting to the gang, yes . . . including yours truly. But it did accomplish one thing; it really made the boys spread out. In some instances, we may have had to call him more times, but when anyone of us finally did get him, the contact was invariably free from QRM and over in about fifteen seconds. I said we weren't going to preach, and look at what I've just done!

A little more on the country lists . . . The DX committee of CQ consists of W6ENV, W6DI (ex-W6NNR), W6SA, and W6JBO. They have done a darn good job in getting the reactions of a large number of DX men. East Coast members of the staff also were consulted on the final list. The five of us have had several knock-down drag-out sessions, and a great deal of credit is due these fellows, because, in many instances, when deciding on a country, they did not reflect their personal opinion as to what should constitute a country, but rather reflected the feelings of many DX men with whom they had previously talked. This same committee will function on our various contests, and any other matters pertaining to DX. Of course, it is obvious at this point that QD is trying to get out of some work. As time goes on, if any of you fellows have any comments to make on the country list, don't hesitate to drop us a line.

Well, let's see what's doing in the little matter of DX. From *J9ABX*, Bill Baxter, who is also W6EFH, we hear the boys on Okinawa have formed the Okinawa Ham Club. One of the first things of importance to you fellows will be where to send your cards for the Okinawa Hams. Send them as follows: J9AAK, APO 239, c/o P.M. San Francisco, Cali-

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Hams are pretty shrewd individuals when it comes to selecting the gear they use. Many thousands knew what they wanted—they're using HQ-129-X receivers on the air every day. That, we believe, is one of the finest endorsements any product can achieve. Materials are still hard to get but hundreds of HQ-129-X's are being shipped every month.

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fornia. Bill says they are getting cards addressed in all sorts of ways, and it should be much simpler just to send them all to the above QTH. More on the Ham Club . . . At present, they have 14 active Hams; the calls of which are: *J9AAK, J9AGT, J9AAM, J9AFM, J9ANA, J9AAL, J9AAI, J9AND, J9ACS, J9ABX, J9AAO, J9ABF, J9AAR,* and *J9AAW* (ex-KA1AW). They meet every other Sunday at some station previously selected, and chew the rag in general on DX and operating procedure. They always try to keep their power *down* to 500 watts or less. Another point which Bill brings out which sounds very good is they usually announce when they are tuning from the high end of the band. This gives quite a number of the W stations their first crack at working a "J". J9AAK is ex-W5KDA, and runs 400 watts on 10 meters; the antenna being a 3-element beam. Recently, in one night, he worked Denmark, Ireland, Egypt, Malta, South Africa, and Australia in the sequence within an hour. J9AAR is on 10 meters using a revamped BC-325 and a 4-element beam. 9ABX is using a BC-610 and has worked quite a lot of DX on all continents. Getting back to J9AAK, he is the oldest Ham on Okinawa, having been there since the invasion. He has had over 2,000 contacts during 1946. Good luck to the Okinawa Ham Club, and let's hear more from you.

W2VY/W6 reports the QTH of *ZK1AA* as S. G. Kingan, Rarotonga, Cook Islands, South Pacific Ocean. ZK1AA operates on about 14,142 kc. For those who don't know it, Doc Stewart, W6GRL, is on quite consistently signing *XU6GRL,* and is located in Nanking, China . . . c.w. mostly, and on 14,120 kc.

We have finally heard from W3LE. Lou really worked a lot of phone DX before the war and is now in the process of getting cranked up again on 10 and 20. His 3-element beam for 20, and a 6-element for 10 will help considerably, but, of course, he won't be able to get these up until spring. W5MY, who is now located at Fort Sam Houston, Texas, says he isn't much of a DX man and proceeds to tell me he worked *YR5V* on 14080, *KL7AD* on 14006, *HZ1AB* on 14090, *UA1KBA* on 14130. It looks as though Doc is doing O.K. to me.

WØYXO is still going to town and has worked *UQ2AB, ZB1A, ZE1JS, VQ8AB,* and *EP1AL.* The country list will answer some of Ken's questions regarding his list of countries.

W2IOP snagged his first VQ2 in getting *VQ2HC.* In addition to this, he has *FG3FP, VQ5JTW, VP2AD* and *KV4AV.* Larry is a little confused after putting up a 2 element rotary, because it doesn't seem to compare with the results from his 272-foot Zepp. As Larry puts it, the experts are now investigating.

W6BET wasn't fit to associate with for a few days, because of working *G6ZO* on 40 meters; frequency about 7145. Speaking of G6ZO . . . the other day, *NY4CM* told W6ENV he had a schedule coming up with G6ZO on 80 meters. W6ENV practically crawled in the receiver, but nothing doing on G6ZO, although he did hear NY4CM.

Another old timer is heard from . . . W7BD. He has been off the air since 1937, but has the itch again, and it must have really been something, because in a little over two months, he has worked 38 zones and 90 countries. He says his antenna is a bit old fashioned, consisting of a wire 138 feet long with about a half-wave running down the pole and being fed right in the transmitter. He says a lot of these contacts were the results of a good old-fashioned dog fight. One of the best was a four-hour affair, resulting in getting *FF8WN.* As he puts it, "Boy, such fun . . . guys piled ten deep!" W7BD suggests that more W stations should ask the foreign stations to QSL via ARRL instead of taking the time to give their name and address over the air.

W3LCP gives a few good QTH's: *VS9AB,* Station Engineer, S.M.W.D., RAF Station, Khormaksar, Aden; *YI2CA,* RAF, Habbaniya, Iraq; *D4AMK,* A.A.C.S., 133 Sqdn., Det. 303, APO 205, % P.M. New York. *G5KW/HZ* is operating portable in the Hedjaz portion of Saudi Arabia. He is located thirty miles inland near the city of Jidda; frequency about 28,120. W3LCP also says *FG3FP* is now signing *FF8FP. VO2AF,* 14,315 kc, is anxious to work W's. *W3GVE* operating portable *KA7,* and *XE1GE,* which is the call of the late Dr. Hard, has now been transferred to XE1GL. *W9BDT* is operating portable *VP4* on Trinidad. *G6WU* was heard on 10-meter phone with D4ACA at the mike, as well as *G5OO* with W7ABB at the mike. The QTH of *ZB1AB* is Port Radar Center, Malta.

KP4KD is still running 120 watts and has 24 and 62 postwar zones and countries. He says he feels like he may W.A.Z some day, if he can only live long enough.

How many of you fellows have worked *PK1VHN?* How many of you thought you were having your leg pulled? He may have told you he was flying over Johnston Island, Italy, Egypt, Saudi Arabia, etc. It just so happens PK1VHN is W6VHN, flying for a Netherlands air line out of Batavia. He was in town a couple of weeks ago, and we took a squint at his log. A few of the boys he worked on 40 meters while flying over Arabia are W1ODU, W1MFV, W2LZR, W1ICE, W2EEN, and W3KAT. He has several pages filled with QSO's and will be very happy to send a QSL card to all those sending in theirs. Send your card to Jim E. Houlahan, 11354 Biona Drive, Los Angeles 34. Of course, these won't count for countries, but will be nice to have as a souvenir.

W6ENV reports hearing another HZ . . . this time, it is *HZ1AL* at about 14,090. W9IHN keeps the W9's in the running and would like to air one of his pet peeves on DX operating. He thinks that when a station has completed a QSO with a particularly juicy piece of DX he should QSY off the DX station's frequency. Even if the W is using crystal control it would be a courtesy appreciated by the gang if he'd plug another rock in the holder. W9IHN will find a lot of the gang in agreement with him!

W6PFD is feeling pretty good, because he has just received his card from *AC4YN.* He said he "worried" that card all the way from Tibet to Los Angeles. W1CPI has been working *G2PU* every Sunday night on 3740 kc which sounds pretty good. W6IBD was working *GI5TK,* the other day, who's frequency is about 28,020 c.w., and is looking for Arizona, Utah, Nevada, and New Mexico.

W2PUD says the Rochester gang has decided to put the town on the map and is, therefore, shooting in a little DX report. For example, W2RTX is a dyed-in-the-wool 10-meter phone man, and in two hours and 40 minutes, he worked this WAC; *XZ2DN, W2PYW, ZS6EQ, GM8MN, LU3BQ,* and *KH6FD,* and then he adds, "this includes an hour off for lunch!" Other good ones for W2RTX are *YI2CA* on 28,300, and *VS9AB* on 28,120. W2QCP is now rebuilding his kw rig. W2PYW picked off *VK6KW* . . . W2FBA worked *G6BY* cross band on 80-20 meter phone. W2AFQ tossed out a CQ after putting up a new beam and raised *W8CJR/XU* on 10 meters. W2MA, who is ex-W8MA, couldn't wait to finish his final, and has worked quite a lot of stuff

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with 10 watts. W2UBT heard *OK2NR* on 80. W2BJH is using a folded dipole with success on 20 c.w. Some of his better ones include *CN8MI* on 14,110, *UA1NP* on 14,140, and *EK1AA*. QTH for EK1AA is British P. O. Box 57, Tangier. W2PUD, himself, has done alright on 20 and 40 with the following: *OK2NR*—7050, *LA2R*—7060, *ON4HRD*—7120, *HH2FE*—7040, *YN1GJ*—7160, *PK6HA*—14040, *OQ5JF*—14195, and *UA1KBA*—14070. Nice going, Rochester . . . keep it up.

W7QAP, of Tucson is back on the "Ham bands." My reason for saying this is that before the war, Bud was on the good ole DX bands, but after the war decided to concentrate his efforts on the six meter band. Therefore, some of his local pals gave him the business on deserting the "Ham bands." Anyway, we are glad to see he has the DX urge, and at present, he is running about 200 watts to a pair of 3C24's. Bud has a shack outside of Tucson, and there is no a-c power piped into the place. He, therefore, has to use a 1 KVA Onan power plant. Here are a few of the best ones worked on 10 meters. *F8EO*—28,000, *ON4BCK*—28,000, *CR9AG*—28,100, *HB9AC*—28,140, *OZ7G*—28,080, *CR7AD*—28,075

W1GKK has been doing a good piece of 20 meter phone work, and kicks through with a few QTH's. *XACP*, Signals Officer RAF Station, Elmas, Sardavia, APO S-497—C.M.F.; *J9LG*, Kwajalein Atoll, Box G Navy 824, FPO San Francisco, California; *PZ1UD*, P. O. Box 109, Paramaribo, Surinam, Dutch Guiana.

It seems good to hear from W7EGR again. Stan is located in Coulee Dam, Washington, which is not a very large town. The other day, while working *VK4KH*, he was asked if he knew a man by the name of Jensen who lived in the town of Coulee Dam. W7EGR said he didn't, but upon investigation, he found it was his neighbor four houses away. It seems this fellow, Jensen, met VK4KH during the war at Brisbane. Summing up the whole thing, it seems to me this is a nice convenient way of being introduced to your neighbor . . . through a chap 8,000 miles away. Another interesting contact Stan had was with *VE8MV* at Fort Resolution on the Great Slave Lake. Apparently, they really have winter up there, because during the QSO, VE8MV said it was 30° below, and a 40 mile wind was blowing. With the heat going full blast in the house, the temperature was 49°. Makes a bit chilly to think about it.

All is not a bed of roses in cranking out this DX column. Just about the time you think you have things well under way, along comes something to take the wind out of your sails. For example, in the December column, we mentioned something about *VP8AD* being on South Georgia Island. Along comes WØVBQ who was told by VP8AD that he was on South Orkney Island. Then along comes W6PCS with this note, "VP8AD asked me to inform you that his QTH is Reg P. McLaren, South Georgia Island, via R.S.G.B." Take your pick, gents! Then, in the same column, we said W6ENV heard "*HB1CE*," and this one, we'll charge to the printer. It should have been, of course, "*HE1CE*," Liechtenstein.

Now, back again to WØVBQ . . . he is one of these left-handed brasspounders that can operate a right-handed bug. He wasn't much on this DX thing before the war, but seems to be doing a first-class job now. He has 63 countries postwar, runs 500 watts to a single 810 on c.w., and on phone, it is 450 watts.

W8WDQ of Cleveland Heights, Ohio, and W3RCQ are forming a net of present and former Coast Guard radiomen on 40 c.w. If any of you fellows are interested, get in touch with either of them.

From "Amateur Radio," published in Australia, we see that *V U2BC* is ex-VS1BC and is now located at Signals Directorate, G.H.Q., Delhi, India.

It is good to hear from W4FPK of Miami. He made a one hour and 52 minute WAC the other night by working *W3EKK/J2*, *VQ2WR*, *OA4AB*, *VK3VW*, *LA7Y* and *W4BT*. We think that's a darn good job, especially from his section of the country. I met Bob a couple of times during the war; he's a radio engineer with Eastern Airlines. Let's have more Miami news.

W6ZZ is the new call of W1WV. He is now just about a native Californian, and judging from the DX he works on 10 meters, it looks as though he is getting into the swing of things out here. His postwar total is 23 zones and 46 countries; all done, of course, since coming to California.

W6PCS says that *VP8AI* is Alan Betts, Pebble Island in the Falklands, and *VP8AM* is Stanley, also in the Falklands. Some of you fellows in the Detroit area might be glad to know I have heard from our old friend Les Maurer, W8INY . . . at least, it used to be his call. Les was out this way about ten years ago or so, and did quite a flock of DX brass pounding at QD's place at the beach. This, of course, was PM (pre-marriage) . . . ah, yes, there's a difference. Anyway, Les graduated from Annapolis just after the war started. He is now First Lieutenant of the U.S.S. Helena, apparently, based in Shanghai. He is looking for a Ham over there from whose station he can chew the rag with some of his pals in the States. Another item of interest from Les is that the Shanghai MIT Club had lunch aboard his ship, and among those present was a Chinese girl who is an MIT graduate, and now chief engineer of a local BC station. He is going to find out if she has a Ham station too.

W1DYV says his QSL card to *OY3G* was returned by *OY3IGO* who claims to be the only real OY on the air. The tough part is that, to date, OY3IGO has not worked a W.

W6LEV is a new one for the column, but since going to his new location near Stanford University, he seems to be doing himself plenty of good. Some of his best include *VP8AI*, *LA1M*, *ST2AM*, *UA3KBC*, *VQ3HJP*, *VQ2GW*, *ZK1AA*, and *VE8NW*. Incidentally, the latter is located on Baffin Island near Clyde River, about 250 miles north of the Arctic Circle. He says to QSL % Eastern Arctic Air Patrol, Ottawa, Canada.

All we have to do, I guess, is mention the W4's are not working much DX, and what happens? They all get on and work DX, and what's best, they let us know about it. For example, W4EWY, from good ole Savannah, has this to say, "so many W9's get in what is left of your hair (what hair?), I thought it would be only fair for a W4 to replace some of that lost foliage." So, here's what he did in a little over eight hours on December 6. He called seven stations and worked six of them for WAC. As he puts it, "These were the victims:" *LX1AY*, *ZS6S*, *LU4PA*, *W6VRF/KG6*, *J9AGT*, and W4GMA. These are all on phone, and he has 72 postwar, and 114 grand total.

W7FNK is doing a good piece of DX from the looks of his postwar list of 32 zones and 55 countries. W6OJW gives the QTH of *J3GNX* as 126th Signal Service Company, APO 713, % P.M. San Francisco.

From G2MI's column, we see that *ZD4AB* intends to QRO to 50 watts. *HC1XC* claims to be in the

[*QSY to page 63*]

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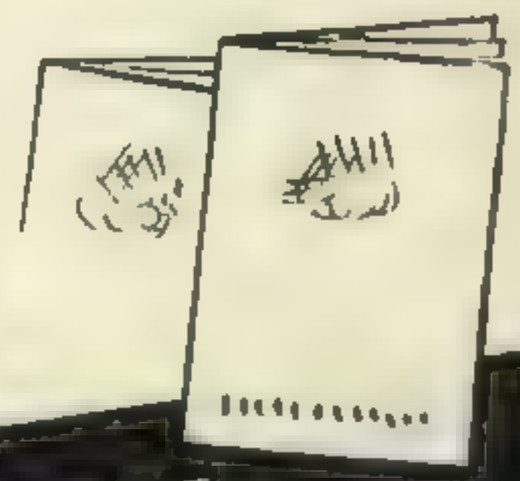

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V.H.F.-U.H.F.

by G. Vincent Dawson, Jr., WØZJB*

ALTHOUGH THERE HAVE been no new reports of transoceanic 50-mc hops, such as the cross-band one of W1HDQ-G5BY and G6DH on November 24th, talk going around on the 28-mc band indicates plenty of interest by other stations outside the U. S. Let's hope these stations do get on and some other long-haul F-2 work is done while the MUF is hitting the right peaks for the next several years. During February, the MUF should go quite high again making possible some good work on 50 mc. Whether the same path will open again remains to be seen, but don't overlook the Pacific area and South Africa. The 28-mc band seems to be very good for liaison work with DX and a lot can be gathered by listening there, especially in the 28-28.5 mc region where DX resides.

Hilton O'Heffernan, G5BY gives us more information on the contact with W1HDQ. Hilton had a wonderful summer setting up new British records on the 58-60 mc band, since his getting on March 1st. However his biggest thrill in ham radio came on November 24th when he heard W1HDQ break through on 50 mc at 1617 GMT, beating out G6DH by a bare three minutes in hearing the *first* 50-mc signal across the Atlantic! At the end of this historic transmission, which started at 1615 GMT and ended five minutes later, W1HDQ announced that he was going to listen for G6DH on 28 mc. G5BY immediately went on 28 mc and called, "CQ rush message to W1HDQ". W1BEQ came back and by 1626 had the message on its way to W1HDQ.

Meanwhile W1HDQ continued to pound in, at times running 10-20 db over S-9 on the meter. At 1645 Ed acknowledged receipt of the message and said he was standing by for G5BY on 28 mc. Contact was made and W1HDQ next listened for Hilton's 58,632-kc signals but unfortunately they were not heard. Cross-band was resumed and continued till the fadeout at 1725 GMT, thus making the contact last one hour and three minutes. During this time G5BY combed the 50-54 mc band again and again, not hearing any other signals either amateur or commercial harmonics.

The converter at G5BY uses a 954 r.f., 954 mixer, 955 osc into a 1.6 mc i-f stage, etc. The antenna used for reception was a W6QLZ, (W7QLZ now). 4-element closed-spaced array, 30 feet high and cut for 51 mc. All equipment was constructed and erected by G5BY.

Checks made the following two days showed the MUF to be around 47 mc, but this fell off rapidly until on Dec. 25th it was about 36 mc. Hilton is still listening daily from 1400 GMT to 1700 GMT, waiting for that peak to take place. He is very glad to contact stations on 28 mc and arrange 50-mc checks with them.

50 MC Openings

December, as in previous years was again open for skip work. Altho signals were not up to the summer openings nevertheless some nice contacts resulted for the gang who stayed active.

Dec. 1st brought a short opening for W5AOK when he worked WØHAQ, WØZJB and WØPKD, first 6-meter DX contact for the latter. The band was open from 1930 CST to 2015 CST, with QSB bad and conditions spotty.

Between 1835 p.m. EST and 2252 EST, W4GJO in Orlando, Fla. had a field day with the following stations: W1HDQ, W1AEP, W1LLL, W1PFJ, W9ZHB, W2KPC, W1GDF, W1DBM, W4FJ, W4CYW, W2IDZ, W3OMY, W8SFG. The W1's came in first and went out last, with the W8's and W9's breaking in briefly around 1930. Grid's contact with W4FJ and W4CYW, both in Virginia, was indicated that shorter skip than usual was on. Ten meters was about dead; to prove it W1HDQ called W4GJO on ten for a test but was not heard, altho when he came back to 6 meters his signal was R-9. Lots more contacts could have been made if activity were higher, especially in the south.

W5HHT, in New Orleans, La. is a new addition to the band, and got in on a good opening Dec. 12th, giving the fellows in Ia. and Ill. another state. Irv was listening to all districts coming in on 28 mc and thought six should be good. Shifting there he heard W9QUV over R-9; with that he called a short CQ saying, "This is Louisiana calling," and upon standing by heard about 15 stations calling him, some no doubt standing up and waving their arms about. W9QUV was heard first, so Irv had a nice QSO with him, W9PK, W8QYD and W8AWK. Each time W5HHT signed with a station, the rest of the band would all call him. Let's hope some more of you holdouts in other states where activity is low, take advantage of this opportunity and join in on the fun.

W5HHT has 100 watts to a 35T, feeding a 250-foot long wire and for receiving a Gonsett converter ahead of a BC-342N. Irv really got a thrill out of his first 50-mc DX and will be looking for more each time he hears short skip on ten meters. His transmitting frequency is 51,048 kc.

The Eager Beavers were on and listened to W4GJO work all over the U. S.; again activity in the south held 'em down. WØYUQ, WØJCQ, WØPKD and usn's had nice contacts with W4GJO and W4HVD, the latter in Albany. Repeat QSOs were made throughout the evening as the W4s were in for over three hours.

W9ALU, our faithful reporter in Illinois, worked W4GJO at 1926 CST and called W5HHT many times. Thanks Hod for the reports, how's about teaching some more of the Ill. gang this here writing

V.H.F.—U.H.F. RECORDS

Call	Distance Miles	Date
50 MC		
W6NAW-W8CIR/1	2600	7/5/46
W6OVK-W2BYM	2500	6/14/46
144 MC		
W3HWN-W1MNF	410	11/19/46
420 MC		
W6FZA/6-W6UID/6	170	9/28/46

No other record reports received for other bands.

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Calls	States	Districts	Other
W1LLL	27	10	
WØZJB	27	10	VE3-4
W9ZHB	26	10	VE3
W1HDQ	25	9	G5-6*
W1PFJ	25	9	
WØYUQ	22	10	VE3
W9PK	20	9	
WØDZM	19	10	VE3
WØSV	18	9	
W3RUE	16	9	
W2IDZ	17	7	
W8SLU	14	10	
WØJCQ	13	10	
W6NAW	13	8	VE7
W1JLK	12	5	
W9ALU	6	5	
W7ERA	5	3	
W7HEA	4	3	
W7JPA	3	2	
W7BOC	2	2	
W7CTY	1	1	

**Cross-band.*

stuff so we can hear from them?

Down Texas way, W5AOK, near Corpus Christi was in on the Dec. 12th opening when he heard KOKA-FM station S-9 on 42 mc. Between 1955 CST and 2300 CST Neal worked these stations; W8AKW, W9MBL, W9ZHL, W9IKI, W9CZD, W8JNL, W8ODF, W8QYD, W3OKU, W9ZHB then the folded. W5GEL and W5MDO was in on the DX with W5AOK, both new stations on in the Corpus Christi area.

The first we have heard of anything near a California Kilowatt being on six meters is that of W7ERA near Portland, Ore. Walt just got the rig on with 300 watts strong and had a nice opening all to himself Dec. 19th, when the W6s from Southern California romped in. The band opened first with weak signals then steadied down for Walt to have nice QSOs with W6FPV, W6JUM, W6HZ, W6GZZ, W6NAW, W6VXJ, W6FIF and W6BOS; he heard W6LSN, W6NYS, W6OHM and W6OGU. A very good opening for mid-December, while the 28-mc gang was battling QRM, the next band higher was hot for nice contacts for those who took advantage.

During the same opening the 19th, W6FPV in Van Nuys worked W7DYD, W7ERA, VE7VY and VE7BQ, most signals having bad QSB but very strong peaks. Calls were exchanged with W7HEA, who says it was his first opening since Nov. 17th when W7KAD broke in. The opening took place from 2000 to 2130 PST.

W7EUI of Kirkland, Wash. worked W6NAW, W6JUM on the 19th with plenty of QSB and conditions very spotty. His transmitter is an 815 with 60 watts to a 3-element horizontal 28-mc beam, which receives signals best off the back!

In Bothell, Wash., W7DYD was in on the Dec. 19th opening, W6FPV, W6OLO, W6JUM and hearing W6NAW, W6BRH. Herb uses a pair of HK-24Gs with 60 watts to a 3-element closed-spaced beam only 12 feet above the ground. He is trying to stir up 50-mc activity in Seattle and will be glad to see more of the gang get on.

Now is the time for you other fellows to start thinking about getting in on the 50-mc happenings. May will roll around sooner than you think, along with Summer DX, when short skip is on ten meters. Come on down and join the fun. Almost anything in the way of a rig or antenna will get you in on it, however for the more serious, a little power and a beam will settle things down when skip is erratic from the E layer. Those interested look over this sequence of reports; you'll be surprised at the cordial welcome you are given if you contact some one who is near you.

International Notes

As previously mentioned there is considerable interest among fellows outside the U. S. which should perk things up even for the serious DX men who roam other bands.

W7QAP reports the good news that CE3CV in Santiago, Chile has a two tube converter working on 50 mc and heard a U. S. FM station on 42 mc the first day he tried it. Ken, CE3CV has not yet succeeded in trying to get permission from the Chilean government to operate on 50 mc, but will be looking over the band when condx are good to the U. S. and will work 28 mc crossband. He often flies to Argentina and is trying to stir up interest on five meters at least, among the ham clubs there. Most interesting, leave us know the outcome.

Here is good news for a lot of us DX-DX'ers on 50 mc. XE1KE in Mexico City is now on 50,024 kc with 100 watts to a 829B and a 4-element rotary beam 90 feet high. He is very interested in making the first two-way contact from there and will be listening from 1400 to 1900 CST daily, also checking 28 mc for anyone who'll take this challenge. What with your location for MUF in all directions above 50 mc something should happen, but quick.

VK3NW reporting in *Amateur Radio*, an Australian publication, says the following are active in VK3, NW, MJ, QO, YJ, AFQ, GG, HK, with more and more of the gang there going over to superhets and xtal rigs. Yep we here in W land should take these VK-ZL skeds more seriously for there *is* activity in the Land Below.

G5BY'S location, 20 miles east of Plymouth, was chosen for its v-h-f possibilities; it is right on the cliff's edge, 450 feet above sea level with 14 acres for Hilton to try antennas on. Well it seems as if it has already payed off for receiving, and let's hope it won't be long until the Gs are on 50-54 mc so those dreams of a two-way contact across the Atlantic can be realized.

VE4DG in Winnipeg worked 30 stations in a 20 mile radius and is now trying to convince the gang there to go over to t-r-f receivers and at least MOPA rigs. Conversion is slow but more of the fellows are coming around to it. Doug is working on a new BC-406 receiver for next summer's DX and hopes to have a xtal rig with an 807 in the final. He lists these stabilized stations who are more serious and looking for DX—VE4GQ, 40 watts to an 815 on 51.25 mc, VE4EA with a vertical beam and MOPA transmitter—and says VE5MW in Oxbow, Sask. is very interested. We down here are interested also and will be looking for the summer's DX to convince all of you up there.

Each time short skip appears on ten, VE2KH in Montreal gets nervous and hopes for a six-meter opening. So far John has not heard a DX signal but there were times when the band should have been open, as he has heard FM signals on his super-regen but unable to copy their QTH. He has a new xtal now and will be found on 50.52 mc whenever the band will open.

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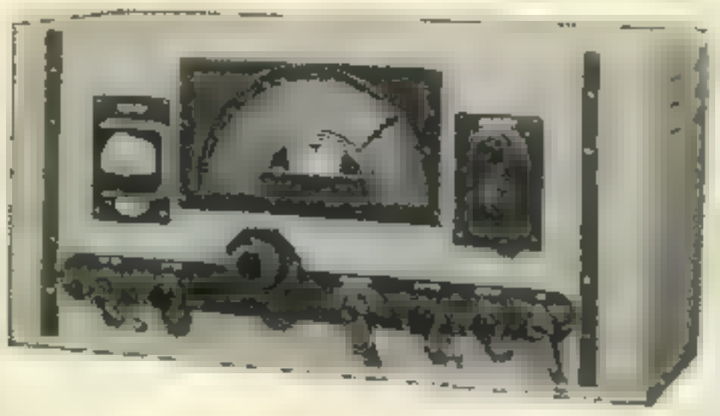

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Ranger Model 905 Transmeter	49.50
Waterman Pocketscope Model S-10-A	65.00
Premax 10 Meter 3 element Beam	30.00
S. C Labs. 10 Meter 3 element Beam	44 95
Federal Selenium Rectifier Quantities of 6 to 49	.99 ea.
Quantities of 1 to 5	1.09 ea.

MILO Radio and Electronics Corp.
200 GREENWICH STREET, NEW YORK 7, N. Y.
BEekman 3-2980
Cable Address: "MILOLECTRO NEW YORK"

50 MC Gang

W6YBP, near Sacramento called us on 28 mc the other day and gave us info on a new surplus receiver for v.h.f. that may help some of the gang who are lacking receivers for either 50 mc or 144 mc, get on the band. The R44-ARR/5 as it was called in the Army, covers 27 mc to 146 mc in three bands, and with some realigning will go up to 148 mc. It is FM-AM, has an S meter, acorn tubes in the front end and a Panadapter plug on the front panel which comes out after the mixer stage and can be used as a converter into a sharper i-f stage. We have one ordered and hope to have a conversion article for you soon.

A new addition to the South Dakota net is WØKQO in Conde. Arnold is working all the gang there including WØDB, WØAEZ (Minn.), WØMZJ, WØBJV and a local WØTXK. WØKQO's station is unique in that he lives ten miles from the power lines and generates his own 110 volts a.c., with a gas-operated power plant. His rig consists of 25 watts input to an 807 feeding a 4-element beam 30 feet high, and a converter for a receiver.

If any of you hear a station signing W3EDD, guess who, yep you are correct, our Washington lad has gotten himself a new call and W4EDD is one call that will be remembered on the 50-mc band now. Robbie is moving to his new home in Chevy Chase, Md. and will have Maryland well represented on six very soon.

This month has brought news from the old gang that used to be active on the 5-meter band. Remember W9AQQ of Indianapolis? Well Clair is now W4JSU in Jacksonville, Fla. and is trying to get back on the band. With the results that W4GJO is getting we surmise Clair is again interested and we shall see him active very soon.

Along the same line, we heard from Fred Bornman, W8QDU who used to feature 90 foot towers and a very potent signal around the country on 56 mc. Fred says that re-conversion troubles has him purty busy right now but he will no doubt be on soon and with FM. Couldn't be Fishbachs's Ale causing reconversion troubles, could it Fred?

WØUOG of Englewood, Colorado has ordered kw coils for his rig to hit 50 mc . . . he'll be a welcome addition to the band. Ed formerly lived in St. Joseph, Mo. and was quite active on 56 mc before the war.

The *Mid-West V-H-F News* published by Bill McNatt, W9NFK says that the boys in the Chicago area are going to give six meters a shot in the arm by invading the band. Those in the invasion are WØYQI, WØDXZ, WØEPM, WØVEZ, WØLWE and WØELV. W9PK will welcome these lads no end.

Hilton, G5BY, at his receiving position. Converters, left to right, cover 50-54 mc 56-60 mc, 28-1.7 mc. (plug in coils). G5BY was the first station to log W1HDQ on 50 mc.

W9AB in Mishawaka, Indiana is still trying to figger out the heard card he received from HB9U in Switzerland on Sept. 22nd, report reception of Harry's *66-mc* signals. Meanwhile he is getting local activity worked up now that old man winter is here. Monday night is meeting night and so far he has worked W9PK, W8CVQ, W8AKR, W8HDM, W8JLQ, W9ECH. Those that will join the meeting soon are W9WDV, W9FNP and W9QCY. W8QQS one of the 56-mc gang is about ready and will join the fun soon. The Monday skeds are called SPA-6, Society for the Promotion of Activity on six!

W7ACD in Shelley, Idaho will be on soon and has been heard on 28 mc checking six, while the short skip was in. Louie will have a pair of VT-127s in the final, which according to WAA should give around 300 watts. For antennas he will have V beams in all directions as he lives on a farm with lots of that open space you city fellers hear so much about. He has also gotten W7EHP in Rigby, Idaho interested and W7DTB of Lewiston, Utah. All you fellows will get hoarse answering calls, if and when you join the herd, being in those badly needed states.

W7HEA and W7DYD would like to see a chart showing the paths that 50 mc is open to during the summer months. Well if the gang will give us reports and add a little about the comparison between 5 and 6 meters we will try to talk our editor into an article at the close of next summer's DX. Is that a deal with the rest of you?

The Sad Sack net consisting of W7BOC, W7AWX, W7CTY, W7JPA and W7HEA in Yakima Valley, Washington are eager for contacts but never get them and can't figure out why. Well fellows it is easy to work skip from 750 to 1200 miles but stretching it out to 1500 miles requires an antenna up high with a low angle of radiation, 200 watts of power will help lots, and converters with good gain in the r.f. Course there is a little matter of something called, "E" layer skip. The breaks will come, so be in there pitching.

W1NF and W1LSN both would like for the fellows with horizontal beams to unsharpen them and have a vertical in the side pocket so that local ragchews may be had with those just getting on the band. It seems that the horizontal beams make the band sound dead when actually it is occupied, unless the station getting on is horizontal.

W1LSN lists 13 stations active on 50 mc in New Hampshire and Maine.

144-MC Notes

Van Field, W2OQI, in L. I., N. Y. wishes to bring to the attention of those fighting for stabilization and non-radiating receivers on 2 meters that in remotely located areas where activity is low, the whistle of a receiver or any kind of a signal is welcome news when you are looking for contacts. Van says that lots of radiation can be cut down by doing away with regeneration control and substituting antenna coupling control or putting in if possible an antenna coupling control with a small vernier dial. Adjustment of receivers so they regenerate well with the least amount of plate voltage, and by fixing the correct amount with a voltage divider, usually turns out to be around 18 to 25 volts. Above all don't use the regeneration control for a volume control as it merely increases the squeal.

Well this brings us back to dividing the band for

[*Continued on page 60*]

Cathode Ray Tubes

Made by North American Phillips

Tube Type	Your Cost
3BP1	$3.95
3FP7	2.98
5BP1	4.95
5BP4	7.95
5CP1	4.95
5CP7	6.00
5FP7	4.25
5JP2	8.95

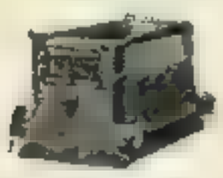
HI POWER XMTR TUBES

837	1.50
872A	2.98
705A	6.75
241B	50.00
861	95.00

Sockets for 5BP1, BP4, 5CP1, 3BP1 and similar types 95c

OHMITE WIRE WOUND RHEOSTATS

Model H 250 ohms 25 watt.	$ .98
Model H 125 ohms 25 watt..	.98
Model J 225 ohms 50 watt.	1.25
Model J 1800 ohms 50 watt..	1.25
Model K 3000 ohms 100 watt	1.98
Model L 250 ohms 150 watt.	2.25
Model N 22 ohms 300 watts.	3.00
Model P 1200 ohms 225 watt	2.75



Cardwell Split-Stator type PK-200-QD. 200-30 mmf per section. Special Hi-Volt with 2" spacing. $9.95

Johnson type 500D35. 500-35 mmf. .08" spacing. (Listed at $11.75) $4.75

SPECIAL ITEMS

Visors for 5 inch 'scopes. . . . $ .75

Tube shields for 2AP1. 98

Broadcast band push-button tuning units inductive or capacitive types. $1.49

Hand generator, type GN-45B. Output: 6v-3a/500v-.14a rated speed 60 cps $5.95

Matched pair precision resistors 6.33 megs. Per Pair. . . . $1.50

Oscilloscope chassis, completely punched, for use with a 2 inch tube. Octal sockets included 15" x 11" x 9" $1.50

Jefferson Power Transformer 115 v 60cy/660 vct-85 ma/6.3v-7.3A /5v-2A/6.3v—.3A. $3.50

Sonde UHF transmitter, complete, less battery $3.75

Silver Button Mica Condensers

stud. mtg. (Erie/Centralab.) 175-180 - 185 mmfd 400 vdc. . . . $.05

400 & 500 mmf . . . . . ea. .10

HI-VOLT CONDENSERS

2mf 400 vdc GE 23F47 . . .	$5.95
G. E. 23F49 1 mf-5000v. . .	5.95
C-D TC-50010 1mf 5000v. .	4.50
G.E. 14F191 .1 mf 10,000v.	6.75
.1-.1mf 7Kvdc GE 25F774.	4.95
.06mf 15Kvdc GE 26F585-G	25.95
.75mf 20Kvdc GE 14F136	22.00

Sangamo Mica Condensers

F3L .0003 mfd 8000V.	$3.75
F3L .0015 mfd 8000V.	4.00
Solar type SX .0015 mf 3000V, list $9.95	.75
Sangamo G-4 .004 mf 20kv	25.50
Sangamo G-3 .006 mf 10kv	19.50

Sonar Sound Detection Unit!!!

Ideal for detecting underwater sounds, such as fish swimming in schools, within a 15 mile area. Using a Rochelle salt crystal, which is about 1000 times more sensitive than quartz, as the active unit the sound is transmitted up a 60 ft. length of cable. It is completely enclosed in a solid rubber sheath. This sound detector was originally used in harbor defense. Coupled to an audio amplifier, this can be found to have many valuable applications. Ask for SD-1. . . . . $9.95

NEW POWER SUPPLY for LM-18 freq. meter. Output: 290v. @ 20 ma; 13 v @ 600 ma. Input: 105-125 v. @ 60 cps; 260 ma; 27.6 W. type 84 rectifier tube; shock mounted Complete with input and output plugs, tube included. . . **$14.75**

OIL FILLED CONDENSERS

G.E., C-D, W.E., and other well known brands

500 mf 200 vdc. . .	$1.95	2 mf 600 vdc. . .	$ .40
2000 mf 50 vdc. . .	2.00	3 mf 600 vdc pyr	.65
4000 mf 30 vdc. . .	2.25	4 mf 600 vdc pyr	.70
1 mf 300 vdc. . .	.25	6 mf 600 vdc pyr	.95
2 mf 300 vdc. . .	.30	8-8 mf 600 vdc. . .	1.49
4 mf 300 vdc. . .	.35	15 mf 220 ac/600 dc	1.50
4 mf 400 vdc. . .	.55	1 mf 1000 vdc . . .	.90
5-5 mf 400 vdc. . .	1.15	2 mf 1000 vdc. . .	1.10
2 mf 550 vdc . .	.30	1 mf 1500 vdc. . .	1.20
.25 mf 600 vdc. . .	.25	.4 mf 1500 vdc. . .	.20
.85 mf 600 vdc. .	.30	2 mf 660 ac/1000	.95
1 mf 600 vdc. . .	.35	1 mf 2000 vdc .	1.10

AMERTRAN PLATE TRANSFORMER. 115 v—60-cycle primary. 6200 volt-ct-700 mil secondary. Size 11"x14"x10" . **$39.95**

½ WAVE RECTIFICATION XFMR 115v-60c/3200v @ 150 mils. MADE BY KENYON **7.25**

CHOKES

12 hy-12 hy @ 150 ma., 15 amp. rating, each price.	$4.25
12 hy @ 200 ma. Made by Thordarson. .	1.95
15 hy @ 165 ma 200 ohms DCR made by Jefferson. Price.	1.95
59 hy @ 100 ma 850 ohms DCR made by Jefferson. Price.	2.00
2.6 hy @ 800 ma stud and terminals at bottom, made by G. E.	5.95

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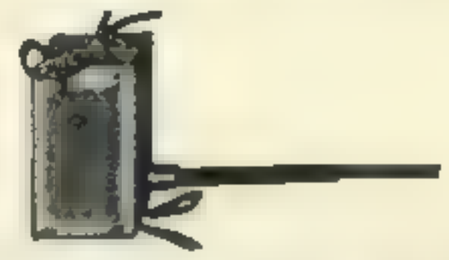

I-F Crystal filter for BC-312. BC 342. Resonant at 470 kc. Crystal included. **$6.95**

MICROWAVE PARTS

MAGNETRONS!! Westinghouse type 2J32 (JAN) just released. Complete information included. The 2J32 is designed for 10 cm. operation. Brand New, packed in individual protective cartons. The 2J32 is listed at $200. OUR PRICE. **$25.50**

Just received: 3J31, 1 cm MAGNETRON 40 Kw peak pulse power. Our low price of. . . . **$20.00**

A FEW 2J38 MAGNETRONS, complete with MAGNETS, (3245-3263 mcs) just ARRIVED! A steal at. **$35.50**

KLYSTRON oscillator tubes. 2K25/723-ab. designed for 3 cm. operation. New, Packed individually. With complete technical data. Listed at $38.00 OUR PRICE. **$7.75**

Sockets for 723a/b-2K25. . . $ .50

30 Mc IF AMP with 2-6AC7's—uses 723a/b. **$10.00**

Waveguide Sections in Stock.
Send for List.

Audio Transformers, Modulators

Mod. for 211's cl. A. 50W. . .	$1.35
Mod. 807 to pr 807's (screen)	1.45
Mod. pr 811's to 813.	5.00
INPUT; Single Button mike to grid 20:1	1.00
OUTPUT; 600 ohms to 6 ohms.	1.00
Chi. transformer; P.P. Mod. & Driver 6L6's per pr. . .	3.30

Audio output transformer Split pri. 1500 ohms each side. Secondary impedance 85 ohms center-tapped—6:1 ratio. 100 Watts output. 5.50

465 Kc BFO coil. 50

SELSYN MOTORS

115 VAC (60cps) Size 5G, *New!* Ideal for remote control or for antenna rotation. Per Pair. **$7.75**

RELAYS

DPDT 10a contacts, 115 v/60 cps coil Allied **$1.79**

SPST 5a, ac; 115v cont. 115v/60 cps. **$1.49**

SPDT contacts; 5a coil rated 115v/60c. **$1.39**

DPST Telephone type; 2p. 1 cl; 1 open; cont. rating, .5a @ 50v, coil rating 3.5 ma (@ 12 K ohms) 1000 vac. **$1.05**

DPDT Leach relay, steatite insulated, with 10A silvered contact. Operates on 110 AC. . **$1.95**

SPDT Struthers-Dunn sensitive keying relay, 5 ma-dc Coil. 110v/60 cycles—2 amp contacts. **$1.49**

SPST Latching relay made by Kurman. Close coil 115v/60c; DCR 1500 ohms. Open coil 115vdc 10 ma.; DCR 5000 ohms. **$2.95**

The YL's Frequency

by Amelia Black, W1NVP - W2OLB*

MOST OF THE OMs WE QSO these days keep requesting that we print more pictures of pretty YLs, along with some vital statistics, so we were especially pleased to receive the pix below, along with the nice letter from W8WUT—really a Miracle!

Says Avis, "I want to tell you how much I enjoy reading your column in CQ, and if any news in my letter interests you, please feel free to use it.

An SWL for quite a while before I thought about getting a ticket, I finally decided that it would be fun to talk to the hams myself instead of just listening. The OM and I both got our tickets just two days before Pearl Harbor—such a time to get a ticket! Didn't even get to call one CQ before the war.

The OM got his rig on last November, and I operated the transmitter under his call, W8WUU. Last August my own rig went on. I run only 50 watts, but use our three-element rotary beam, which really helps with low power. I operate ten-meter phone almost exclusively, but do venture on eleven once in a while. Am strictly a phone gal and just don't care for c.w.

Avis Miracle, W8WUT

*446 Ocean Ave., Brooklyn, N. Y.

Ham radio seems to run in our family—besides the OM and myself, there's my brother, W8VIB, and sister-in-law, W8YBL.

Am quite a DX fan and have done pretty well considering the low power. Some of my choice ones are J2AAT, Yokohama—J9AAI, Okinawa—ZB2A, Gibraltar — W2SLW/KL7, Adak, Alaska — and W1LTQ/TF, Iceland, also several stations in South Africa. Need only South America for WAC and hope to work someone down there soon. Am also after WAS and have thirty states confirmed so far.

Was the first YL to become a member of the Connecticut Screwball Network . . . Have contacted quite a few YLs and am always on the lookout for some new ones. YLs take heed—if you really want to work a Miracle on ten just give me a call!"

At this writing we have just returned from a meeting of the New York City YLRL. Unfortunately it took place the night of this season's first snow in New York, (all washed away by the rain) so the attendance was sparse. The meeting quickly migrated to a nearby cafeteria, where, over good hot coffee and coffee cake, the problems of ham radio from a YL's viewpoint were discussed.

Any man who's ever complained about his wifes' lack of interest in radio would have gotten a good sympathetic chuckle from the conversation. Poor Kate, W2RAQ, has still been unable to stir a spark of interest in her OM. OWL, Ruth, said her husband has now reached the stage of grabbing the mike, and seems to thoroughly enjoy talking. He also insists that he'll get a ticket himself some day, though Ruth thinks it'll be 1950 before he starts studying.

W2PBI, Jerry, had the happiest report. Her OM's talking on the air constantly now, calling Jerry in only when necessary for the signing on and off. Jerry says she can't get near the mike when he's home but is so glad he's interested that she doesn't mind at all.

The OM has also put up a new three-element beam for Jerry (and himself) and can be seen these days heading for the firehouse with handbook and license manual. Jerry predicts there'll be a station in the firehouse some day soon.

"You're really lucky," says Kate, "wish my OM would take an interest . . ." (Sound familiar, boys?)

New call in Manhattan is W2SOP received by Bea Tannenbaum.

YL of the Month—Loretta Ensor, WØUA

In June of 1941 when Marshall Ensor, W9BSP, was awarded the Paley amateur radio award for 1940 he was accompanied to the presentation in New York by his sister Loretta, W9UA, who was also commended for her constant assistance in conducting their "radio school." This award followed the Ensors' code practice instruction and courses in the fundamentals of radio, transmitted from fall of 1929 until December 7, 1941, when Loretta signed off the final lesson.

During winter months Marshall and Loretta transmitted nightly, each session lasting over an

[Continued on page 65]

HARRISON HAS IT!

HARRISON HAS IT!

ALL STANDARD LINES

We are
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for the top quality manufacturers and we now have in stock lots more new, latest improved production Ham gear! Visit our stores today, for everything you need. We promise you fresh, clean material—quicker—at the lowest current prices—and, above all, our sincere desire to be of friendly, helpful service.
As one of the world's largest distributors of Communications Equipment, we are delivering plenty of

● RECEIVERS

right now! ALL MAKES—practically all models. If you want your new set in the quickest possible time send your order to HARRISON!
For example:

HALLICRAFTERS—
S-38 ..... $39.50
S-40 ..... $ 79.50
S-36A. FM-AM-CW 27.8 to 143 mc 307.50
S-37 —130 to 210 Mc 591.75
SX-42. —New FM-AM.— .54 to 110 Mc 250.00
HAMMARLUND—New "Super-Pro"
SPC-400-X. .55 to 30 Mc 334.05
Speaker in Cabinet $13.20
HQ129X, complete with speaker in cabinet 173.25
NATIONAL—
NC-240-D. Complete with speaker 241.44
HRO-5TA-1. Complete with pack and speaker 303.00
RME-45—Complete, with speaker 198.70
RME-84—Complete, with speaker 98.70
Collins 75A-1 ..... 375.00
Panoramic Adapter 99.50

TRANSMITTERS
Meck 60T $ 150.00
Temco7 5-GA 495.00
Collins 32V-1 475.00
Temco 500 GA $1,800.00
Sonar Narrow Band FM Exciter 39.45
Collins 70 E 8 VFO Unit 40.00

● TEST EQUIPMENT?
Certainly! Harrison has it! We can supply practically anything for the Amateur, Serviceman, and Laboratory. Here are a *few* of the many items we have in stock *right now* for immediate delivery to you—(Even if what you want is not listed here, send us your order—we'll do the rest!)

MULTIMETERS
Supreme 543 ..... $18.95
Precision 832-S ... 23.04
Supreme 542 M ... 26.15
Weston 564 ..... 28.80
Triumph 333-S ... $29.70
Simpson 215 ..... 32.50
Precision 844. ... 33.20
RCP 424 AP. ... 33.50
Simpson 260 ... 38.95
RCP 461 AP 43.50
Triplett 625-N 45.00
Triplett 2405 ..... 56.75
Supreme 592 ..... 58.95

TUBE CHECKERS
RCP 315 ..... $59.50
Precision 912 ..... 61.20
Jackson 636 CP ... $62.50
Precision 915 ..... 84.41

TUBE AND SET TESTERS
Hickok 534 ..... $138.30
Silver "Spark" Signal Tracer $39.90
Supreme 562 Audolyzer 127.00
RCA 162-C Chanalyst 162.50

OSCILLOSCOPES
National CRU $39.90
Dumont 274 ..... 99.75
RCA 155-C $115.00
RCA 160-B 185.00
Waterman Pocketscope 66.00

VACUUM TUBE VOLTMETERS
Silver "Vomax" ... $59.85
RCA 195-A 69 50
Jackson 645 ..... $75.00
Hickok 203 ..... 79.80
Hickok 125 ..... $94.75

SIGNAL GENERATORS
Jackson 640 ... $49.00
RCP 705 ..... 49.50
RCA 167-B ... 63.75
Supreme 576 ..... $68.95
Triplett 2432 ... 88.50
Bliley 1A Crystal Oscillator ... 69.50

Harrison Select Surplus Bargains

The cream of the surplus market! Good—new—guaranteed material. Top value, always. You don't "take a chance" when you buy *anything* from Harrison!

- **TUBES**—3C24/24G HF Triode $1.49
  FIVE for **$5.96**
  3E29, 829B. $3.89
  9002, 9003 FIVE for **$2.49**
- **ANTENNA TUNER**—BC 939-A (Hallicrafters AT-3) *Complete* with condensers $29.95
- **TELESCOPING ANTENNA**—Brass, plated. Lightweight. 15 inch, extends to 12' 10". ¾" dia. FB for mobile, or rotary elements. Each $1.95
  SIX FOR **$10.44.**
- **VARIABLE CONDENSERS**—Dual 150 mmf per section, .175" gap. Johnson 150 DD70 ..... $7.95
  Cardwell XE-240-XD. Dual 240mmf, .100" gap $9.95
- **ROTARY COAXIAL COUPLING**—Continuous rotation. 52 ohm constant impedance—coaxial sockets each end. Lapp $7.75
- **CRYSTAL CONTROLLED CALIBRATOR AND MONITOR**—Navy CGQ-61033. With spares $4.95
  (With batteries ..... $5.95)
- **KW MODULATION TRANSFORMER** — 1:1 ratio. Conservative 550 Watt Audio rating. Screen winding. 38¼ lbs. $24.75
- BC 610 (HT4) TU Tuning Units $2.50
- Final Tank Coils. THREE (our assortment) for $1.98
- Antenna Wire. No. 10 Phosphor Bronze, stranded, 125 feet (2 insulators at 75 feet) $1.97
- Stranded No. 8 copper wire. Heavy insulation. 125 feet in 7 foot lengths $1.19

(Please see our previous ads for full descriptions of above items.)

- **SYLVANIA DIODE CRYSTALS**
  1N34 ..... $1.50 1N35 ..... $3.95
- **COILS**—B. & W. — Bud— National — Millen — etc. Harrison has complete stock!

● COMPACT VIBRATOR PACK

FB for transceivers, portable receivers, etc! Delivers: 135 volts at 30 ma; 67½ volts at 8 ma; 1.5 filament or 6.3 heater, bias, and microphone voltages.
Completely filtered—neon tube voltage regulator—remote load-start relay—ruggedly made for dependable Navy use. 1¾" x 3⅝" x 4". Weighs only 2 lbs. Works on any 6 volt dc source.
Complete vibrator pack, less only battery (use it on four flashlight cells, your car battery, etc.) **$3.95**

With a clip-in RECHARGEABLE Willard Storage Battery. Unbreakable, NON-SPILL, plastic case. **$5.50**
(110 Volt AC .2 amp. Trickle Charger ..... $3.45)

With TWO clip-in Willard Primary batteries **$5.75**
(See our Dec. *QST* ad.)

● LEACH ANTENNA RELAY

Ceramic insulation for low loss. Heavy silver dp-dt antenna contacts plus sp-dt for control of receiver, etc. 115-volt AC coil. HSS value **$2.79**

MAIL ORDERS? Certainly! Just list everything you want (items in this ad, or any ad, magazine or catalog) and include remittance. Prompt shipment.
V▼ 73 de

Bil Harrison, W2AVA

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PHONE—BArclay 7-9854 • EXPORT DEPT.—CABLE—"HARRISORAD"
[JAMAICA BRANCH—172-31 Hillside Ave.—REpublic 9-4102]

ESSE Specials!

SCR-522 100-156 Mc RECEIVER AND TRANSMITTER

One of the most interesting and useful pieces of surplus equipment. Designed for plane and ground station use, this unit offers remote control of any four pre-selected crystal controlled frequencies in the spectrum of 100-156 Mc. This spectrum covers facsimile, air navigation aids, airport control, railroad, police, urban telephone, as well as the amateur band at 144-148 Mc. October Radio News gives details for converting the SCR 522 receiver section, BC-624.

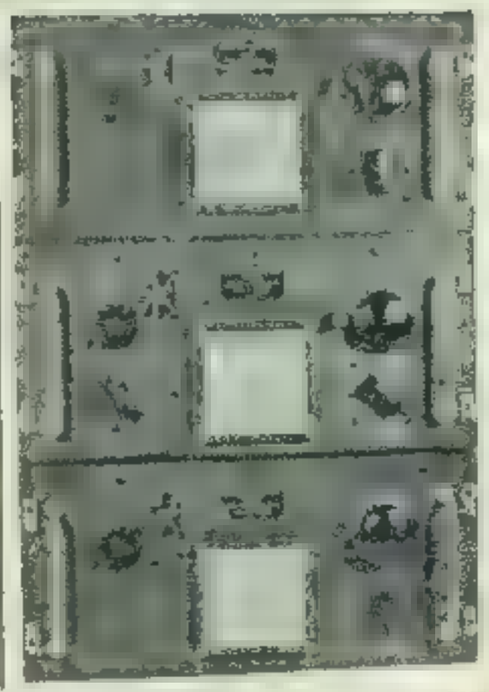
Transmitter section, BC-625, is voice amplitude modulated and has an output of 8-9 watts.

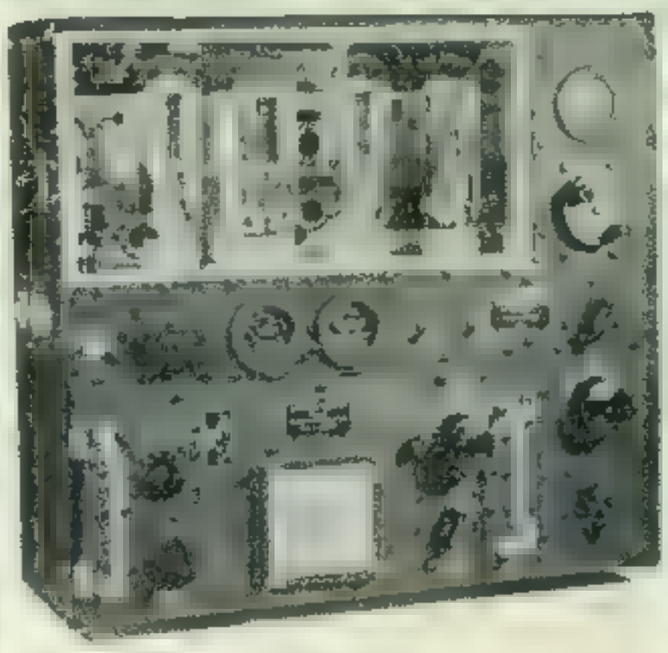
Tubes used and included: 2-832, 3-12A6, 1-6G6, 2-6F7, 1-5U4, 3-12SQ7, 1-12C8, 1-9002, 3-9003, 1-VR-AH7GT.

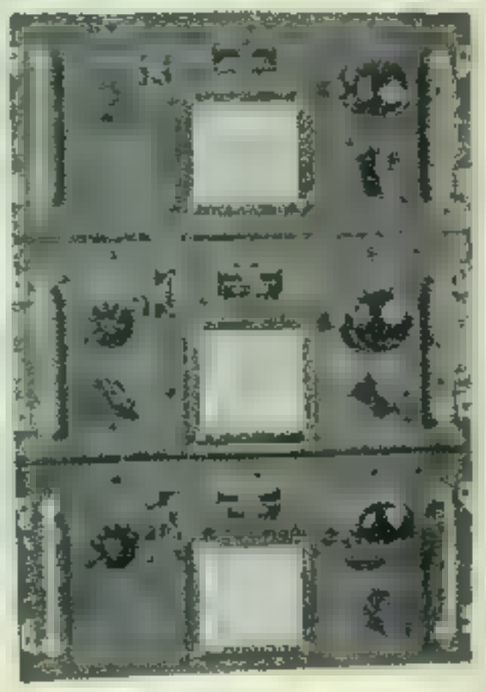
These units were removed from planes but are guaranteed and are shipped in operating condition, including tube cord or head and cable plugs ready to connect to dynamotor or other power supply.

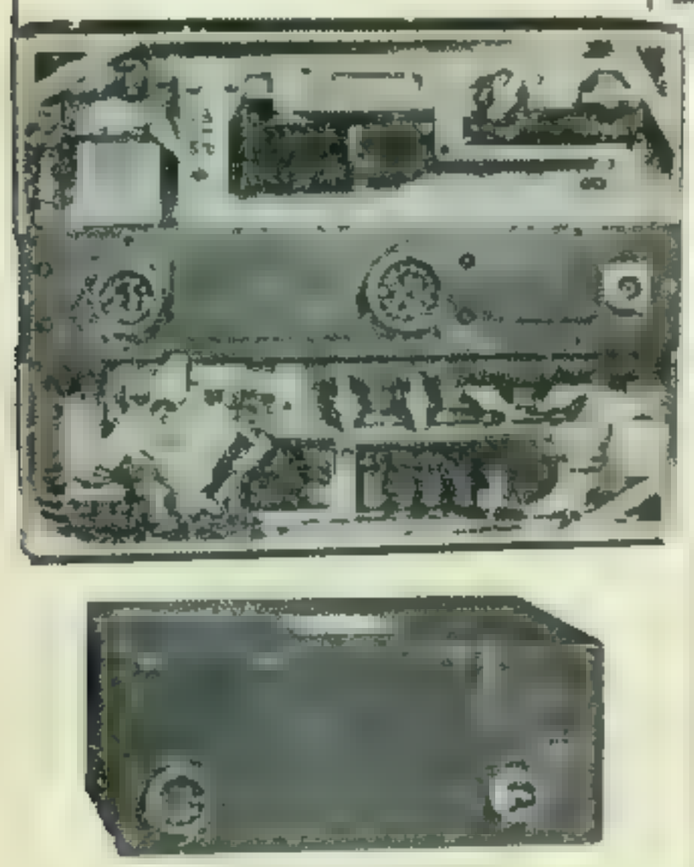
Weight 49 lbs. Shipping weight approx. 65 lbs.

Price **$39.95** each









TELRAD MODEL 18-A FREQUENCY STANDARD

Measures signals 100 Kc.-45,000 Kc., with check points at 10,100 and 1,000 Kc with a high degree of accuracy. Power supply is self-contained for operation from 110, 130, 150, 220, and 250 V, 25-60 cycles AC.

Complete with tubes, dual crystal, and instruction book.

Brand new, in original carton **$24.95**

BC-375 E GENERAL ELECTRIC MOPA TRANSMITTER

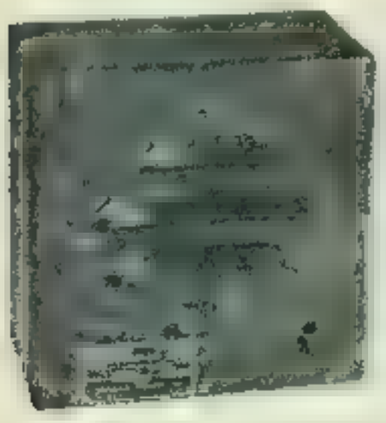
Used as liaison transmitter in bombers and ground stations. Frequency range of 200-500 Kc. and 1,500-12,500 Kc is covered by means of 7 plug-in tuning units furnished. By slight modification operation on 10 and 20 meters is possible. Oscillator is self-excited temperature compensated type. Power amp. is neutralized class "C" using 211 tube and is equipped with antenna coupling circuit to match practically any antenna. Modulator is class "B" using two 211 tubes. Power supply is 24 V. DC dynamotor which furnishes 1,000 V. at 350 M. A. However, transformer shown on this page is ideal for construction of 110 V. AC power supply. Transmitter output conservatively rated at 42.5 watts, phone 75 watts CW, but may be pushed to 150 watts.

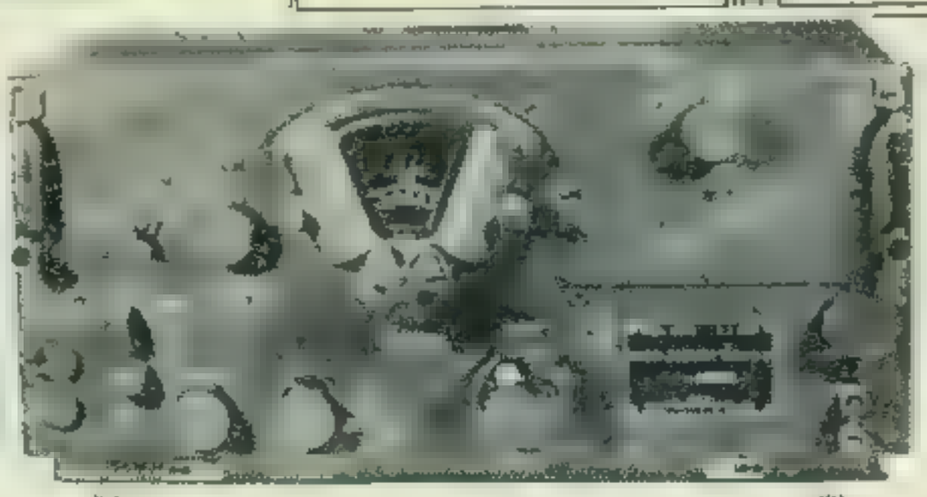
Complete as shown with tubes, dynamotor, seven tuning units and cable connector plugs. Removed from bombers but checked and guaranteed.

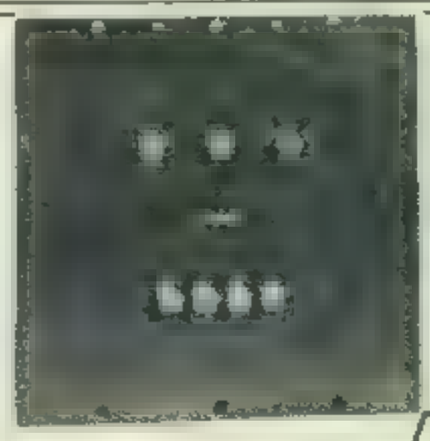
Price complete **$36.95**

Weight, approximately 150 lbs.

Dynamotor for 24 V. DC operation of SCR 522 ..... $8.50. Wt. 39 lbs.







3-10 Hy. 750 ma. Swinging Choke for filtering of power 5,000 V. insulation. Size 6 1/2" x 7 1/4" x 8". Weight, 38 lbs.

Brand new, **$7.50** each

LS-3 LOUDSPEAKER

6" PM type, housed in heavy metal case. For use on BC-348 Receiver. Self-contained output transformer to match 4,000 ohm impedance. Used but guaranteed satisfactory.

Price ..... **$7.50** each

BC-348 COMMUNICATIONS RECEIVER

Excellent selectivity, sensitivity and stability make this the most outstanding of any receiver yet available from government surplus. This receiver will give outstanding performance wherever used. Built to withstand vibration and features gear driven 100-1 ratio vernier tuning control. Six bands—200-500 Kc. and 1.5-18 Mc. Two stages RF, 3 stages IF, BFO, crystal filter, manual or AVC. Complete with tubes and 24 V. DC dynamotor. Easily converted to 110 V. AC operation. These receivers used, but can hardly be told from new. Guaranteed operation. Models N, M, P, and Q available—please specify.

Price **$44.75** each

H. V. PLATE POWER TRANSFORMER

1425-0-1425 sec. at 750 ma. Pri. 110-115 V. 60 cycle, tapped for low and high power. These transformers were made for RCA equipment. Size 10¼" x 10" x 8". Weight, 81 lbs.

Brand new **$17.50** each

TERMS:
CASH with ORDER or 25%
BALANCE C.O.D.
All Items Shipped Collect

ESSE Radio Company

130 W. New York St. - Indianapolis 4, Ind.

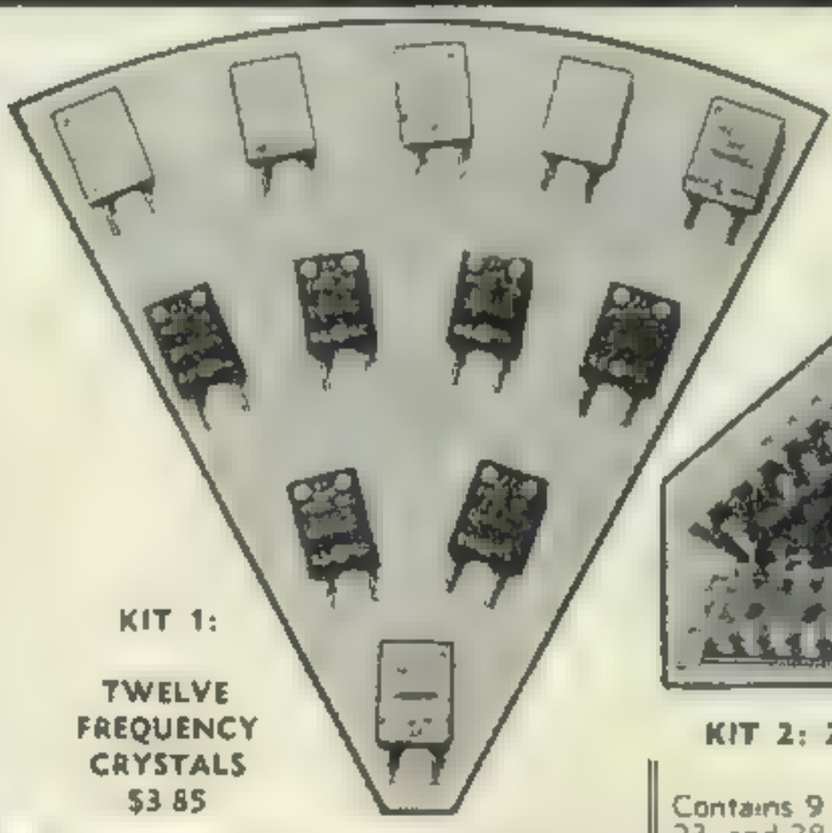
ESSE Specials!

AN/PRS-1 MINE DETECTOR

For detecting metallic and non metallic substances by ear or visual indication. Used for locating pipes treasure etc. Complete as shown with spare tubes carrying case and ready to operate by connection of batteries not included. Shipped in original overseas moisture proof container.

Price brand new **$14.95**

Weight, packed for shipment, 10½ lbs.

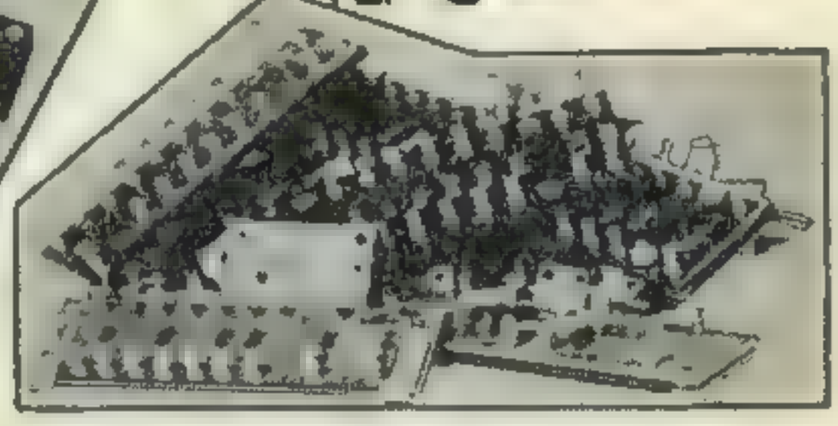


KIT 1:

TWELVE FREQUENCY CRYSTALS $3.85

Contains assorted frequencies between 3,000 Kc and 8,000 Kc in FT 243 crystal holders. We pick at random from mixed supply and cannot select frequencies.

Complete Kit of 12 Crystals **$3.85**



KIT 2: 25 RESISTOR MOUNTING STRIPS AND TERMINAL LUGS

Contains 9 bakelite resistor strips for mounting 2, 4, 9 23, and 28 resistors which may be cut apart for any requirement. Also contains sixteen 1, 2, 3 and 5 lug terminal strips.

Complete Kit **$0.95**

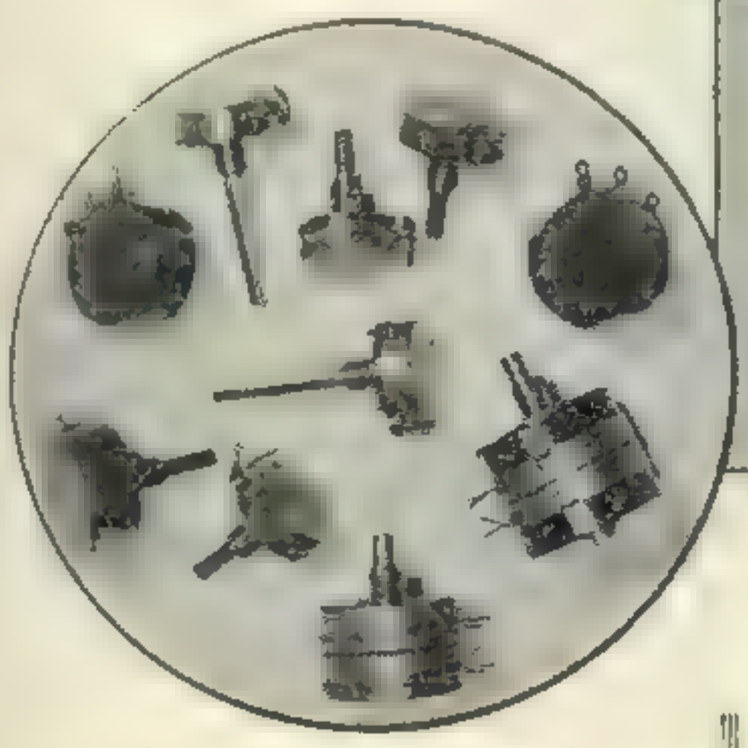
ITEMS FOR THE RADIO AMATEUR, EXPERIMENTER OR SERVICE MAN

Available in lots varying in small fractions of their original cost—all brand new.

KIT 3. 24 TUBE SOCKETS

Containing the following new Ceramic low loss sockets: 2-Acorn 6 pin Octal Amphenol, 4-6 prong Molded, 4-5 prong wafer, 4-4 prong wafer, 2 molded bakelite 7 pin octal female plugs and 2-7 prong tube tester sockets with center socket for checking pilot lamps.

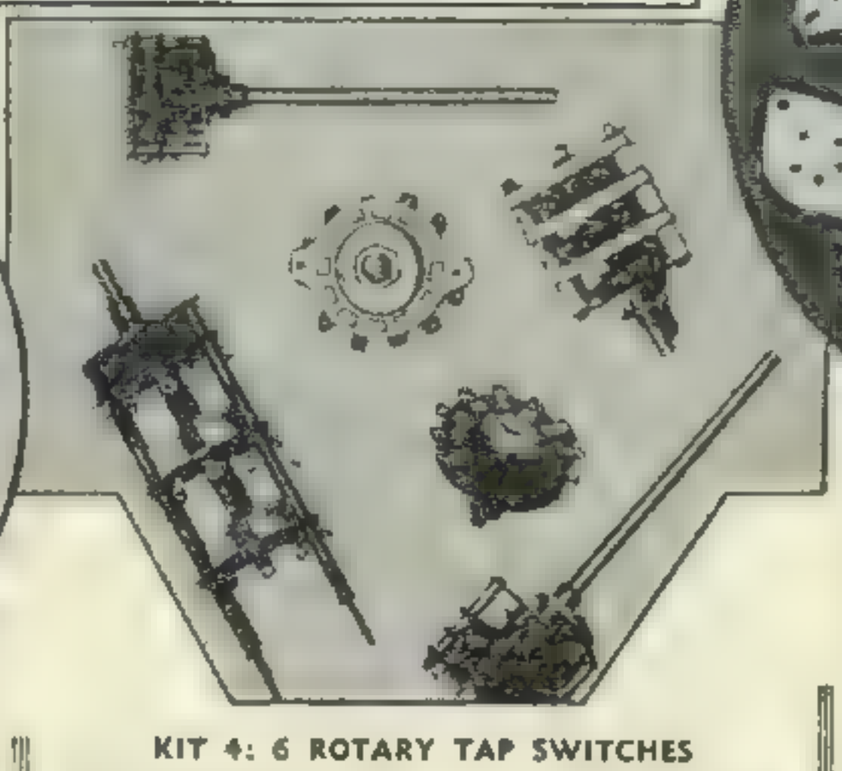
Complete Kit **$2.35**



KIT 5: 10 POTENTIOMETERS

Contains 3-.5 meg. carbon with ½" length shaft, 2-.3500 ohm carbon ½" shaft, 1-1000 ohm wire wound ½" shaft, 1-dual 25,000 ohm wire wound with ⅜" shaft, 1-dual 30,000 ohm wire wound with ⅜" shaft, 2-100 ohm wire wound with screw driver adjustment.

Complete Kit of 10 Potentiometers ... **$2.85**



KIT 4: 6 ROTARY TAP SWITCHES

Contains 3 pole 11 position non-shorting, 1-2 pole 5 position non shorting, 1-6 pole 4 position non-shorting, 1-1 pole 9 position non shorting power tap, 1 ceramic insulated special 6 pole 4 position with double contact wipers on 4 poles and 2 positions on 5th pole.

Complete Kit of 6 Switches **$1.85**

CARBON THROAT MICROPHONE

Ideal for plane portable or mobile operation, also for construction of lie detectors, toys etc. You can't afford to be without a few at the price. Adjustable elastic strap fits any neck. Works into 200 ohm impedance input circuit. Used but in good condition.

Price **$0.25** each

ESSE Radio Company

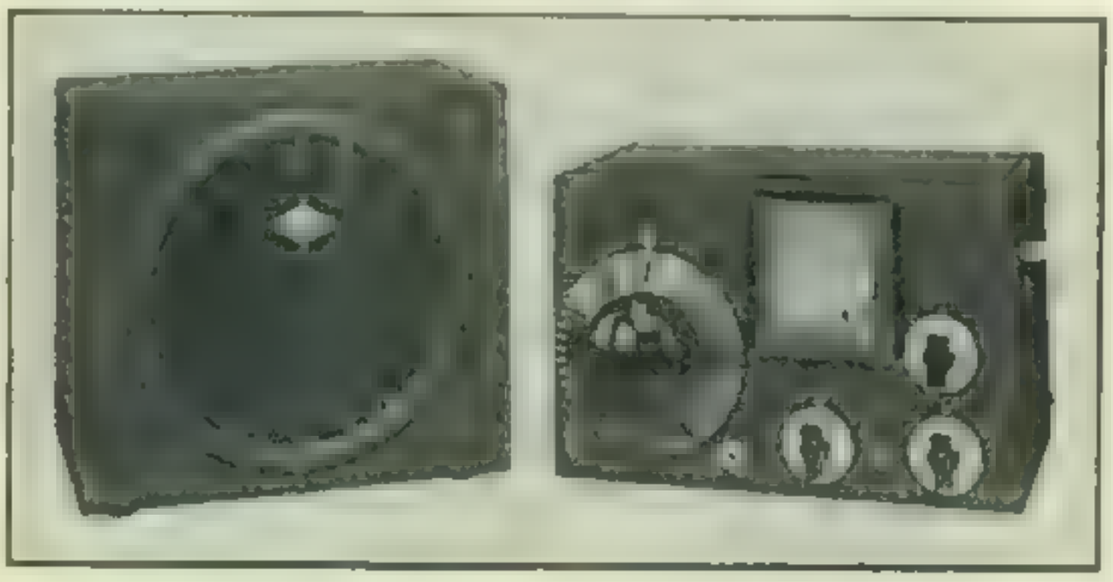
130 W. New York St. - Indianapolis 4, Ind.

parts & products

V-H-F Receiver

The NC-One-Ten-A, radio receiver covering the band between one and ten meters, has been placed on the market for general sale to the public by the National Company of Malden, Mass.

Of particular use to laboratory research workers and engineers, and amateurs, the One-Ten-A was developed through a thorough study of the operation of a pre-war predecessor and a redesign made of the circuit, mechanical arrangements and constructional details in light of recent advances in high frequency technique.



A four-tube circuit is used, composed of one tuned r-f stage, a self-quenching super-regenerative detector, and a transformer coupled to a first stage of audio which is resistance coupled to the power output stage. Tubes required are the 954-r.f.; 955-detector; 6J5-1st audio; and 6V6-2d audio.

The PW type dial revolves ten times in covering the tuning range and this provides a scale length of approximately twelve feet, thus ensuring extreme accuracy. Special models of the One-Ten-A have been built for radiosonde use in weather balloons during the war and this new post-war model incorporates the information gained as a result of these experiments.

Coaxial Antenna Relay

Price Electric Corp., Frederick, Md., is now manufacturing a coaxial relay that is ideal for amateur use. The type 6350 a-c relay is a coaxial unit designed to transfer a 50 ohm antenna transmission

line from receiver to transmitter without mismatch when proper cables are used.

Three Signal Corps type fittings are provided to accommodate RG-58/U cable plugs for antenna, transmitter, and receiver cables. This relay will switch 750 watts of r-f power when impedances are properly matched. Type 6351 relay is the same as the Type 6350 except that one set of SPST—normally open auxiliary contacts and one set of SPST—normally closed contacts are added. Auxiliary contacts are rated for 250 ma at 300 volts d.c. for e.c.o. and receiver switching. Overall dimensions of relay with auxiliary contacts are 4½" long, 3" wide, 2" high.

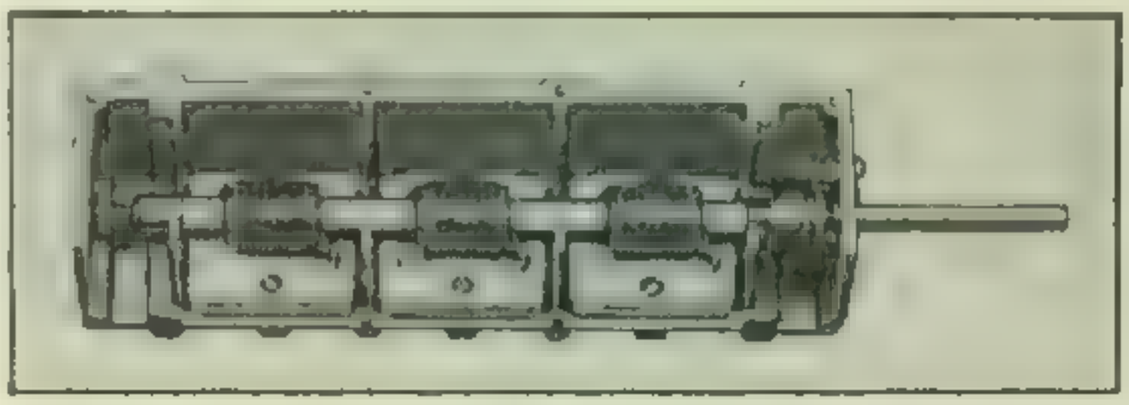
E. F. Johnson Co.

Types of vacuum tubes have multiplied until identification of sockets and cap connectors that fit, frequently involves groping and delay. A reference which indentifies a suitable socket and tube cap connector for each of some 800 transmitting, control and regulator, rectifier, receiving, and miscellaneous tubes, is now available. The first publication of its type, copies are available without charge through local Johnson distributors or by writing directly to the E. F. Johnson Co., Waseca, Minn.

Variable Inductance Inductuner

P. R. Mallory & Co., Inc., Indianapolis, Ind., has issued a new technical information bulletin on the Mallory "Inductuner," which is now in production.

This patented Mallory development is a device providing infinitely variable inductance tuning from 44 to 216 mc. This entire band is covered in 3600 degree rotation (10 turns) of the shaft, which may be rotated by hand or motor driven.



Alignment of a receiver employing the Inductuner requires considerably less adjustment than one using conventional tuned circuits. Application of the Mallory Inductuner in the amateur field are numerous, and include receivers, converters, preselectors, etc.

Vacuum Condenser

Raytheon Manufacturing Co., Power Tube Division, Waltham, Mass., has announced the first of its new line of vacuum condensers, the RC100-20.

Construction features which contribute to low r-f resistance of Raytheon condensers are silver-plated copper contact terminals, large diameter copper-to-glass seals, and a multi-plate assembly which is brazed into a single unit. These nickel plates are assembled with heavy silver-plated copper spacers brazed between them, making an extremely rigid construction. Due to this rigid construction, there are no audio frequency-mechanical

[*Continued on page 62*]

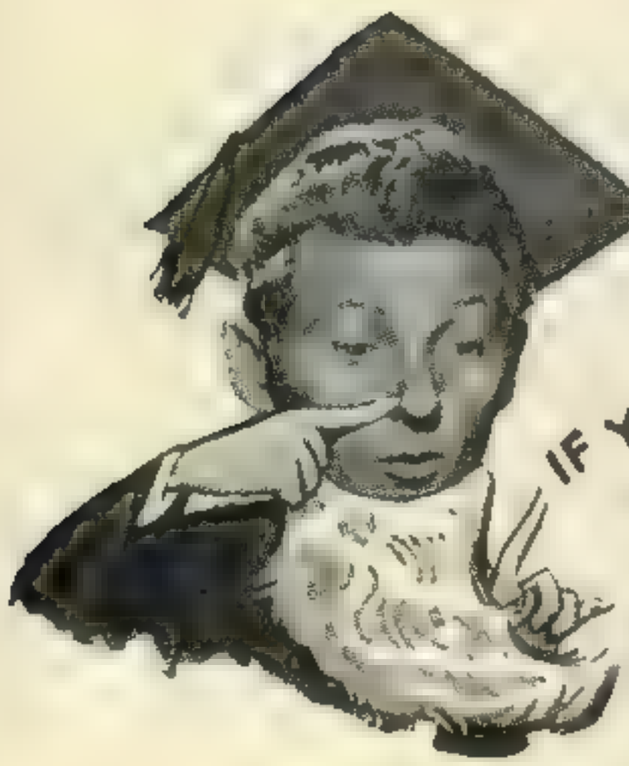
How to Avoid Saving Money

by DANNY KAYE

To avoid saving money, the first thing is to cut off all your pockets. Thus you will have to carry your money in your hand. Which will insure that you—1. spend it, 2. lose it, 3. get it taken from you—*quicker!*

Also avoid piggy banks. The kiddies in particular are victimized by such devices, often saving quite a bale of moolah. And be sure to avoid budgets or, before you know it, you'll be in the black!
It is best to draw your pay and walk down Main Street buying anything you don't particularly hate.

Above all, don't buy any U. S. Savings Bonds—or it's *impossible* not to save money! These pay fat interest—4 dollars for 3 after only 10 years! There is even an insidious Payroll Savings Plan which is *automatic*. With it, you may even find yourself embarrassed by a regular income! Get-gat-gittle!



Danny Kaye

SAVE THE EASY WAY...
BUY YOUR BONDS THROUGH PAYROLL SAVINGS

Contributed by this magazine in co-operation with the Magazine Publishers of America as a public service.

The Advertising Council

Northern New Jersey Amateurs

The first annual dinner dance of the Northern New Jersey Radio Association will take place on Saturday, February 15, 1947 at the Teterboro Golf Club, Route 6, Teteboro, New Jersey. Festivities will begin at 7:30 p.m. and an unusual and unique evening of sparkling entertainment has been arranged.

The Teterboro Golf Club is known far and wide for its excellent cuisine and the best from their well stocked larder is being reserved for this special dinner. Tickets are $3.50. Further information and tickets may be obtained by addressing the Northern New Jersey Radio Association, Hackensack YMCA, Hackensack, New Jersey.

U.H.F.-V.H.F.

[*from page 52*]

meeting all conditions of crowded areas and remote spots. Jim Brannin's proposal of splitting the band and putting the xtal boys in the low end and the SE towards the high end. Remember this is the lowest frequency we have to operate mobile with using modulated oscillators; this keeps activity up in cities separated from others where activity may be low. Summing it up fellows, it looks as if it is going to be a gentlemen's agreement, where some means must be devised to keep everyone happy.

In Sacramento W6CLV and W6VQK tried 144 mc from VQK's plane with a DK-3 trans-scvr. Ignition noise was so bothersome that only the loudest stations could be heard. Another trip is planned again soon with the ignition QRM eliminated. For those that have the Abbott DK-3s designed for the 112-mc days some headaches can be averted by making these changes the way W6CLV describes . . . he has converted lots of them. A smaller tank coil is made of two turns one-half inch in diameter, and soldered on the same lugs that supported the original 112-mc coil. The coil is then squeezed or expanded to hit the band. If the receiver does not regenerate then filament chokes are in order and can be the v-h-f type available commercially or wound on a one-quarter inch form of about 20 turns of No. 24 wire, mounted right on the filament connections of the socket.

In South Dakota, WØBJV of Watertown and WØTI of Milbane are contacting on 144 mc, the distance being 35 miles. Both are using the new VHF-152 converters.

Ed Ladd, W2IDZ says there is lots of activity and he has worked 71 stations in 2 states, not mentioning his set-up on 144 mc.

WØTQK in Parkville, Mo, 14 miles north of the kc area, has 265 watts to a xtal rig into a 3-element horizontal beam, and a 3-tube super-regn receiver. Others in the area on are WØJZN, WØSJG (Overland, Kans), WØGK and WØDDX. The gang would like skeds with Topeka, St. Joseph and others interested in a try for DX.

You've no doubt heard of the Eager Beaver V-H-F Net . . . well we now have it divided into routes and the latest is the Senator Claghorn route from WØJCQ to WØYUQ. For several weeks the boys tried skeds on 144 mc with no success. Finally one night the wind blew YUQ's antenna about 30 degrees south of west and he heard JCQ weakly; he told JCQ to point his antenna south of east, and low

HOW MANY USES CAN YOU SUGGEST FOR B & W *Miniductors?*

These little inductor coils have so many different uses, we don't know them all ourselves! Every day amateurs tell us about new applications they've discovered.

Miniductors can be used in all sorts of coil applications for receivers, transmitters, test equipment. They'll prove useful as tank circuit coils, r-f chokes, high-frequency i-f transformers, loading coils and in many other ways. They can be cut to any required length. They can even be slit lengthwise and flattened to make excellent Faraday Shields.

They're light in weight, yet extremely rugged. Q factor is amazingly high, due to the almost total absence of insulating material in the electrical field.

Experiment with MINIDUCTORS yourself! You'll be pleasantly surprised how handy they are to have around. Your jobber has them!

Individually packaged. Low in price. Diameters of 1/2" and 5/8" supplied in 2" lengths. Diameters of 3/4" and 1" in 3" lengths.

Write for the complete **B & W** *Catalog*

BARKER & WILLIAMSON 237 FAIRFIELD AVENUE UPPER DARBY, PENNA.

LIMITED EDITION - LESS THAN 50

book bound copies of CQ's 1946 ISSUES ARE LEFT.

Each copy
$8.10
Postpaid

Delivery will be made promptly.

Book-Bound in Cloth, Dated in Gold Foil Lettering Jan-Dec.1946 just like the illustrated copy of our 1945 bound copies.

Send us a check or money order for $8.10. You will receive, postage paid, one of these beautiful cloth book-bound, hard-cover, copies of the twelve 1946 issues of CQ. Dating is in genuine gold foil lettering that will be matched in subsequent annual bound volumes. Hurry — orders with remittance attached will be filled in the sequence received. Less than 50 copies remain.

RADIO MAGAZINES, INC.,
342 Madison Ave.,
New York 17, N. Y.

Sirs: I remit $8.10 for which please send me 1 bound volume of CQ issues of 1946 as advertised.

Name .....

Address .....

Zone..... .....State..... .....

In amateur radio today perfection is an absolute necessity. The old days of hit-or-miss operation are gone forever. A good example of the need for perfection is the ever-present menace of the PINK TICKET. Today with frequency multipliers in practically all transmitters, it is easy to hit the wrong Harmonic. The positive way to tell which band you are on, is by using the BUD WM-78 wavemeter.

The BUD WM-78 covers all amateur bands from 160 to 5 meters . . . accomplishing this by bandswitching. Due to its sensitivity the BUD WM-78 can also be used as a neutralizing indicator.

$8.25 your cost at your radio parts dealer.

BUD RADIO, INC.
CLEVELAND 3, OHIO

and behold the signals came up to S-9. It seems there is a range of low 500 foot hills between them although its only 18 miles directly east or west: some bouncing no doubt. The rig at WØYUQ is a SCR-522 transmitter into a 4-element horizontal beam 45 feet high, home brew converter, while WØJCQ has 100 watts to a 829B, 3-element beam and a home built converter. Your conductor expects to join the Claghorn route soon, when time permits building.

1200-2400 MC

W1BBM of the super-highs now has a cavity oscillator on 2400 mc and the output has surprised even him. Altho there is no activity on 2400 mc he is ready for any if it should occur.

He is building a radial type cavity for 1200 mc and would like some of the gang with surplus 1200-mc equipment to contact him for skeds, especially in the New York City area, as he has an almost salt water path to there.

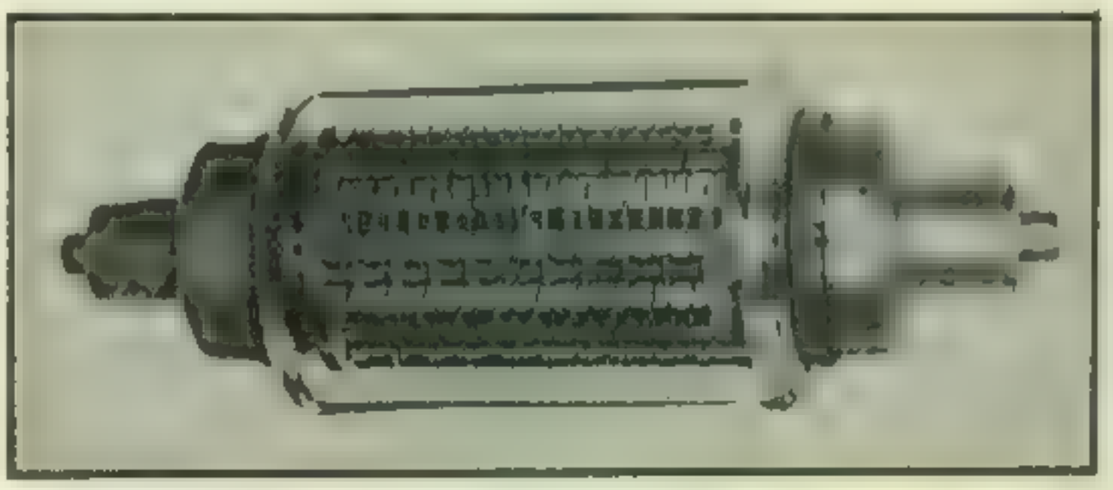
Well fellows this is it for another month. If your call isn't in the Honor Roll how about letting us know what your score is and we shall be glad to include same in the next issue. One other thing . . . . please get the reports in our hands by the *25th* of each month so our Editor in the big city can go out in the country once in a while. Thanks and see you next month.

PARTS AND PRODUCTS

[*from page 58*]

resonances in the condenser to interfere with their operation in high voltage plate modulated tank circuits.

The heavy copper terminals on the Raytheon vacuum condensers also provide high heat conductivity so that heat generated in the condenser may be conducted through the terminals and dissipated in the associated circuit elements.



Raytheon's RC100-20, the first in the new line of vacuum condensers, has a capacitance of 100 μf, and is designed for high voltage applications in tank circuits, and in plate blocking or plate by-passing functions. Maximum rating of the RC100-20 are:

Capacitance	100 plus/minus 4% μf
Peak r-f voltage	20,000 volts
D-C voltage	16,000 volts
RMS current	60 amperes
Frequency	At ratings up to 30 mc
Ambient temperature	50° C.
Length (over-all)	7.25 inches
Diameter	2.5 inches

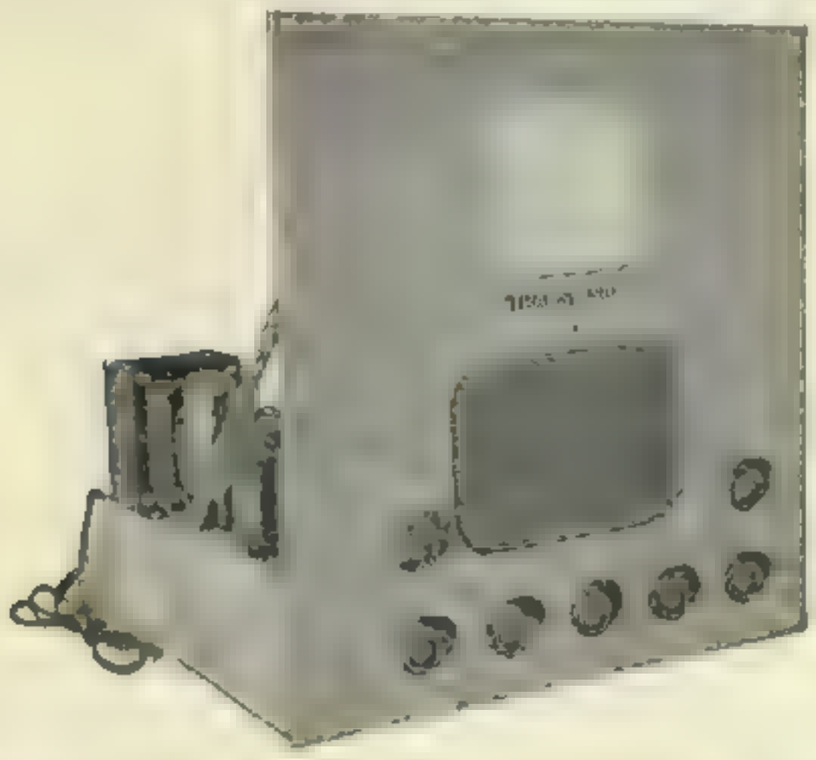
Television Kit

A Television Kit engineered for easy assembly is ready for distribution. In addition to all the components, the necessary solder, wire, and complete easy-to-assemble directions are included.

The picture tube included in the kit is a seven inch electrostatic type, giving a large enough picture to be viewed by eight to fifteen people with comfort.

There are 18 tubes, three i-f picture stages, 3.5 mc band width in the picture circuit, newly designed sweep circuit, 3000 volts second anode supply, giving sufficient brilliance to allow daylight viewing.

There are three television channels adjusted to give reception for each individual location. Sensitivity is good enough to allow reception within ap-



proximately a fifty mile radius of the television station. Further information may be obtained by writing to the manufacturer: Transvision, Inc., 108 Fourth St., New Rochelle, N. Y.

CQ DX

[*from page 46*]

Galapagos Islands. *VR5BY*, apparently, a pirats according to ZLs and VK. *XABU* on Rhodes Island 14,075, QTH of *FM8AC* is Robert Martinon, Box 260, Fort De France, Martinique, French West Indies. *VP4TB* is Bob Wilson, 61 Mucurapo Road, Port of Spain, Trinidad. *VR2AB*—28,456, *VR2AC*—28,400, *VR2AF*—28,320, all on phone, can be reached via Box 338, Suva, Fiji.

Charlie Stimpson, W9TRD, of Radio Amateur Call Book fame says the correct QTH of *AC3SS* will be listed under Sikkim in their winter edition. The F9 prefix is being assigned to those newly licensed amateurs in France who had no call before the war. For those who have worked *F9A H*, here is his QTH: M. Roger, 87 bd Felix-Faure, Chatillonsous-Bagneus, S. France.

A couple more addresses sent in by one of our contributors, W2SKV, might be of interest. *VE8MI*, R. D. Lang, Negus Mines, Ltd., Yellow Knife, N. W. T.; *TI2BF*, Paco Bermudez, Taca Airways, San Jose, Costa Rica; W2SKV will forward QSL's to *FA8US*.

During this last month, we received mail from three or four contributors, who, apparently in their anxiety to get their stuff in the mail, forgot to sign their names or call letters. Never having studied hand writing, it's been rather tough for me to figure out who was working this DX, so if some of your hard work doesn't appear in print, this could be the reason. How about signing your name and call letters fellows? It will really help.

This is about all the poor mill will handle this time, but we will be expecting to receive your zone and country list in accordance with the rules set forth at the beginning of the column. No doubt, you are going to get in the coming DX contest, and let's all try to use a little bit of good operating procedure in going after some of this stuff. Don't zero-beat the DX man's signal. He might be trying to work someone else. With what time there is available, I will be in there pitching too, and if I try real hard, I think I can work my quota of 9's without much trouble. 73.

Are you sure you're in the band?

You Can Now Build A Secondary Frequency Standard At Low Cost With A JK Stabilized

100 KC CRYSTAL

Here, at last, is a precision 100 KC crystal that the amateur can afford.

It can be used to excellent advantage when building a Secondary Frequency Standard to work the edge of the bands and check points throughout all of the bands.

In spite of its low price, the finest techniques known to the industry today are employed in its construction. The crystal has extremely low drift, the electrodes are pure silver and mounting wires are soldered directly to the silver plating. Result: A rugged unit that will stand vibration without changing frequency, nor will it age or increase frequency with use. Holder is completely sealed against dust and moisture.

Don't let the low price deceive you — it's a beautiful item — has eye appeal and a performance record that will please you for years to come!

Amateur Net Price **$6.95**

CIRCUIT DIAGRAM FURNISHED

A circuit is supplied with each crystal giving complete information on how to build an inexpensive Secondary Frequency Standard.

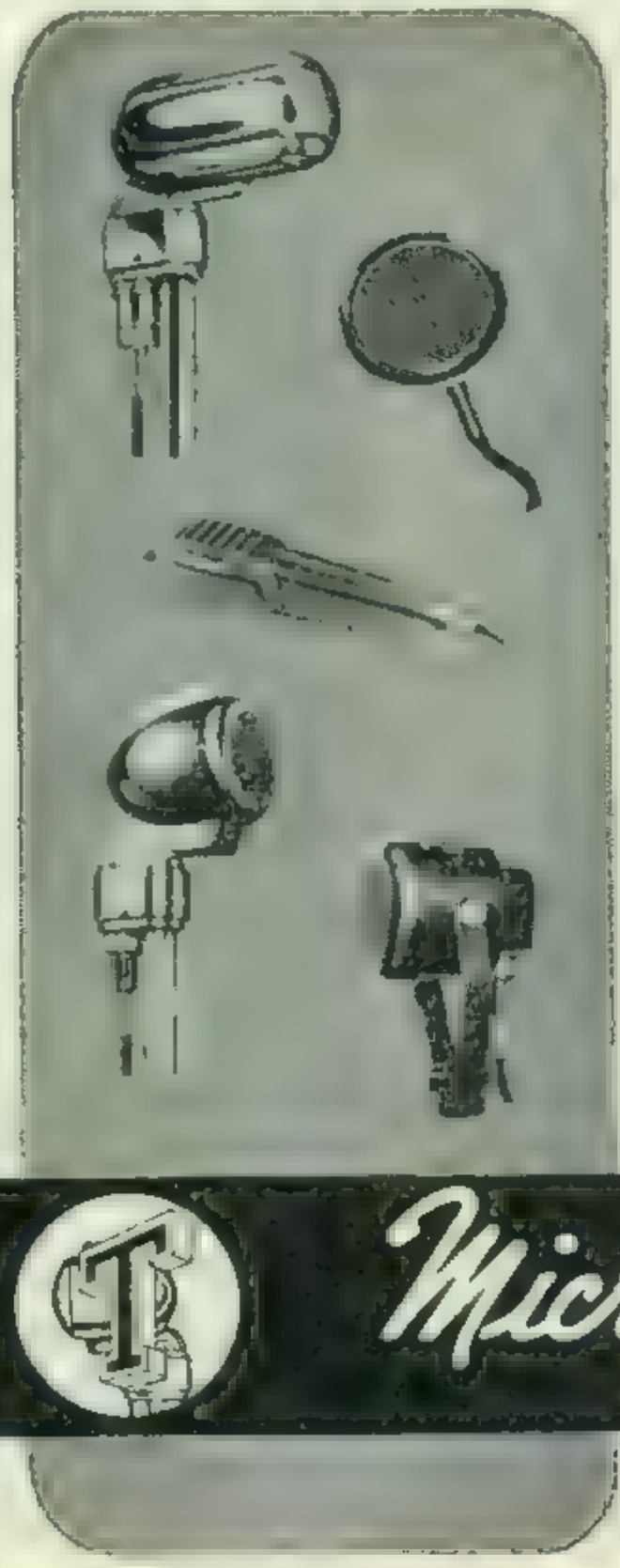
the JAMES KNIGHTS Co.

SANDWICH, ILLINOIS

Country List *[from page 32]*

Country	Prefix	Zone
Somaliland, French	FL8	37
Somaliland, Italian		37
South Georgia	VP8	13
South Orkney Islands	VP8	13
South Sandwich Islands	VP8	13
South Shetland Islands	VP8	13
Southwest Africa	ZS3	38
Soviet Union:		
European Russian Socialist Federated Soviet Republic	UA1-3-4-6	16
Asiatic Russian S.F.S.R.	UA9-Ø	18-19
Ukraine	UB5	16
White Russian Soviet Socialist Republic	UC5	16
Azerbaijan	UD6	16
Georgia	UF6	16
Armenia	UG6	20
Turkoman	UH8	17
Uzbek	UI8	17
Tadzhik	UJ8	17
Kazakh	UL7	17
Kirghiz	UM8	17
Karelo-Finnish Republic	UN1	16
Moldavia	UO5	16
Lithuania	UP	15
Latvia	UQ	15
Estonia	UR	15
Spain	EA	14
Sumatra	PK4	28
Svalbard (Spitzbergen)		40
Swan Island	KS4	7
Swaziland		38
Sweden	SM	14
Switzerland	HB	14
Syria	(AR)	20
Tanganyika Territory	VQ3	37
Tangier Zone	EK	33
Tannu Tuva		23
Tibet	AC4	23
Timor, Portuguese	CR10	28
Togoland, French	FD8	35
Tokelau (Union) Islands		31
Tonga (Friendly) Islands	VR5	32
Transjordan	ZC1	20
Trieste		15
Trinidad and Tobago	VP4	9
Tristan da Cunha & Gough Island	ZD9	38
Tunisia	FT4	35
Turkey	TA	20
Turks and Caicos Islands	VP5	8
Uganda	VQ5	37
Union of South Africa	ZS	38
United States of America	W, K	3-4-5
Uruguay	CX	13
Venezuela	YV	9
Virgin Islands	KV4	8
Wake Island	KW6	31
Wales	GW	14
Windward Islands	VP2	8
Wrangel Islands		19
Yemen		21
Yugoslavia	YT-YU	15
Zanzibar	VQ1	37

February CQ will carry an announcement outlining details of how reprints of the Official Postwar DX Country List, W.A.Z. list, and other DX information can be obtained. Watch for it!



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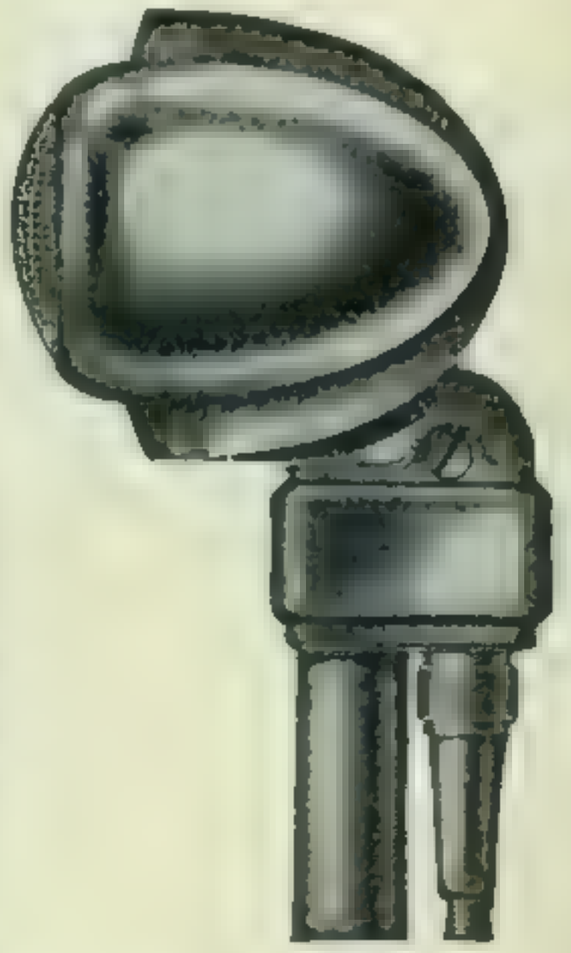

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YL'S FREQUENCY

[*from page 54*]

hour. Thousands of amateurs, many of whom began the course with only the alphabet memorized, were able to pass their amateur code test at the end of the season. One year, cards were received from 550 students; another year 338 known students took their amateur license exams. As Loretta wrote us, she and her brother have worked together so much that it is almost impossible to write of the works of one alone. As well known under the call W9BSP as W9UA, Loretta has always used her own station call in conjunction with W9BSP.

Loretta received her amateur license and 9UA call in 1923, while still in high school. Her immediate purpose was to establish a radio station in the Olathe High School, where Marshall was an instructor. Loretta's call was used by the school radio club, and 9UA became the first radio station to be permanently located in a high school in Kansas. This call, later changed to W9UA, was used by the club until 1940, when the station was moved to the Ensor home.

Loretta gave us a description of their first rig, which, she said, was a self-excited transmitter with two 202s in the final, used for both phone and c.w.; her first contact was with 9RR in Kansas City who was using spark. As highline power was not available at that time, this rig was driven by a 1½hp International engine which furnished the plate supply; storage batteries supplied the filament. Running 20 watts on 190 meters, the following year they worked CB8 in Argentina (during a North and South American DX contest) for the first W9-Argentine contact.

During those years, antennas, transmitters, receivers, and different power supplies came and went. The source of power was always an important consideration. After the International engine, which was cranked by hand at the beginning of each transmission, came a 32-volt house lighting plant battery and a 4-hp Cushman engine with starter. Next 1200-volt storage B batteries were charged by a Ford engine, driving a 2-kw, 32-volt generator. Finally in 1937 the 110-220 volt line was brought in.

From 1925 through '27 Loretta spent most of her time on 40-meter c.w. with a fifty-watt transmitter, doing a fair amount of message handling on 40 and also on 180. She reminisced, "Soon after we began operating on the 40-meter band we received a letter from a Portuguese radio operator on board ship, who wrote, 'Your sigs give turn to the globe.' He went on to explain that while off the coast of Madagascar in the Indian Ocean he had heard my signals. Quite a feat in those days . . .

It was just about then that Jack Conner of Sidney Australia, wrote me that I was the first woman to cross the Pacific by radio waves. I could write of many experiences of those days—how a South African contact was coveted, and we were able to contact two different stations there—of my many pleasant ragchews with the Australian station, 2YL, and later hearing to my sorrow of his electrocution by his own transmitter—how we could tell when a mail boat docked on either coast by the bunch of foreign cards received. The 40-meter receiver was a three-circuit capacity-controlled affair with separate audio amplification, and had to be operated by 'remote control' because of body capac-

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ity, so even a nod of the head would change the tone of the signal and would bring me wide awake when dropping off to sleep . . . "

Loretta at present is chairman of the YLRL zero district and is one of the original members of this organization. Pre-war she took part in the 160-meter YLRL phone nets.

Besides Loretta and Marshall, who is again an Industrial Arts instructor at the Olathe High School, there is a third ham in the family—Marshall's wife, Ina, W9TRY, an instructor in the local junior high school.

Loretta still lives in Olathe, Kansas, on the Ensor farm. Her hamming activities have suffered a little in recent years, as she carried on the management of the farm during the war, while Marshall was in the navy. She's still busy with canning, care of the bees, and gardening, and very proud of some unusual varieties of flowers and trees that she's been able to grow on Kansas soil. Her other interests are fancy sewing (quilting, crocheting, embroidery, hand-made rugs), stamp collecting, and local grange activities.

CONVERTING THE ART/13

[*from page 85*]

lator. Check for output by touching a neon lamp to the plate of the oscillator and the first multiplier. The second multiplier is checked by switching the *A* control to position seven and then touching the neon lamp to the second multiplier plate.

If the appropriate changes have been made in *L101*, the frequency range in position one of the *A* control should be approximately 1700 to 2100

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kc. On position two of the *A* control the oscillator frequency range will be from 2000 to 2600 kc. We may now make a coarse calibration of the 1700 to 2100-kc range of the oscillator. First, tune a communications receiver to 1700 kc. Set the *A* control to position 1, the emission selector to *CW* and the power level switch to *Calibrate*.

When the low voltage is applied, somewhere between divisions 500 and 700 on the *B* control a signal should be heard in the receiver. The 1700-kc point on the *B* dial should be tabulated. Tune the communications receiver successively to 1800, 1900, 2000 and 2100 kc and at each spot frequency tabulate the setting of *B* when the transmitter signal is picked up. The 2100-kc position should be at approximately 1900 on the *B* control.

The same coarse check can now be made for the 2000 to 2600-kc oscillator range, except that the *A* control is now at position 2.

It is now possible to begin calibration of the *B* control. First set *A* to position 1 and set *B* to the approximate setting for 1700 kc. Plug a pair of headphones into the *Sidetone* jack and adjust the sidetone gain control for maximum signal in the headset. Rotate *B* control slowly for zero beat with the output of the 50-kc oscillator CFI-8Q. This zero beat point is now the correct 1700-kc calibration. The reading, however, should be very close to the approximate setting as determined in the coarse calibration. It is necessary to emphasize here that in addition to the 50-kc beat from the CFI unit there will also be a 25 and a 12.5-kc beat, which are much weaker, Therefore it is of utmost importance that the strongest beat be tuned and that the *B* control reading correspond fairly closely to the coarse readings. Once this primary point has been found, the *B* control is slowly rotated, zero-beating at every 50-kc point and carefully tabulating the control markings for each 50 kc in range.

The same procedure is followed in calibrating the 2000 to-2600-kc range, except the *A* control is moved to position 2. An actual calibration of a converted AN/ART/13 is shown in *Fig. 3*. This should be of assistance where the wiring and coil modifications have been followed as indicated in this article.

Adjusting the Multipliers

Peaking the multiplier circuits for operation in the amateur bands is accomplished by the adjustment of multiplier padder condensers, *C111* and *C115*. *C111* consists of six adjustable ceramic padder condensers associated with the first multiplier stage. *C115* consists of another six ceramic condensers, but associated with the second multi-

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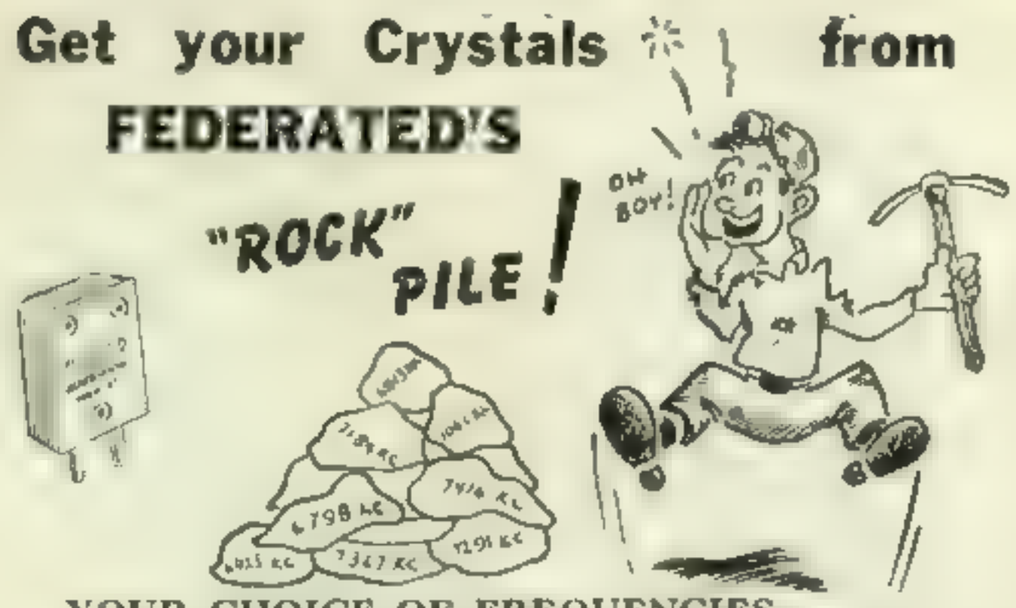

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1	1700-2050	DOUBLER		3.4 to 4.1
2	2050-2550	DOUBLER		4.1 to 5.1
3	1700-2050	TRIPLER		5.1 to 6.1
4	2050-2550	TRIPLER		6.1 to 7.6
5	1700-2050	QUADRUPLER		6.8 to 8.0
6	2050-2550	QUADRUPLER		8.0 to 10.2
7	1700-2050	DOUBLER	TRIPLER	10.2 to 12.3
8	2050-2550	DOUBLER	TRIPLER	12.3 to 15.3
9	1700-2050	TRIPLER	TRIPLER	15.3 to 18.4
10	2050-2550	TRIPLER	TRIPLER	18.4 to 22.8
11	1700-2050	QUADRUPLER	TRIPLER	20.4 to 24.0
12	2050-2550	QUADRUPLER	TRIPLER	24.0 to 30.6
13	Not used	Not used	Not used	

Fig. 2. Frequency range for the various positions of the "A" control on a converted Collins Autotune transmitter, showing fundamental oscillator range, multiplier function and final output frequency.

plier stage. With the transmitter placed bottom end up and the panel facing you, the first bank of condensers visible is the *C111* group. They are designated by letters from *A* to *F* and correspond to steps 1 to 6 on control *A*. The second band of condensers is the *C115* group, which, from left to right, are designated *A* to *F* inclusive and correspond to steps 7 to 12 on control *A*.

The multiplier stages are peaked in the following steps.

1. Set *A* to position 1 and *B* to the center of the 80-meter band.
2. Apply low voltage supply, place power level switch in the *Tune* position and the emission switch on *CW*.
3. Place the meter selector switch in the *Grid* position.
4. Use an insulated screwdriver and slowly rotate the 'small' metal lip that protrudes from capacitor *C111A* and adjust for maximum grid reading.
5. Rotate *A* control to position 2, the 2 peak *C111B* for maximum grid reading. Repeat this for steps 1 to 6 on the *A* control, peaking the proper *C111* padder in each case.
6. Set the *A* control on position 7 and peak *C115A* for maximum grid reading. Repeat this procedure on position 8 and for *C115B* and each position to 12, peaking the proper *C115* padder as before.

To make fine adjustments for each band it is necessary on 40 meters to set the *A* control to position 4 and *B* to the center of the band. Then re-adjust *C111D* for maximum grid reading. For the 20-meter band set *A* to position 8 and *B* again to the center of the band. Then re-adjust *C115B* for maximum grid reading. Recheck adjustment *C111B* for maximum grid reading.

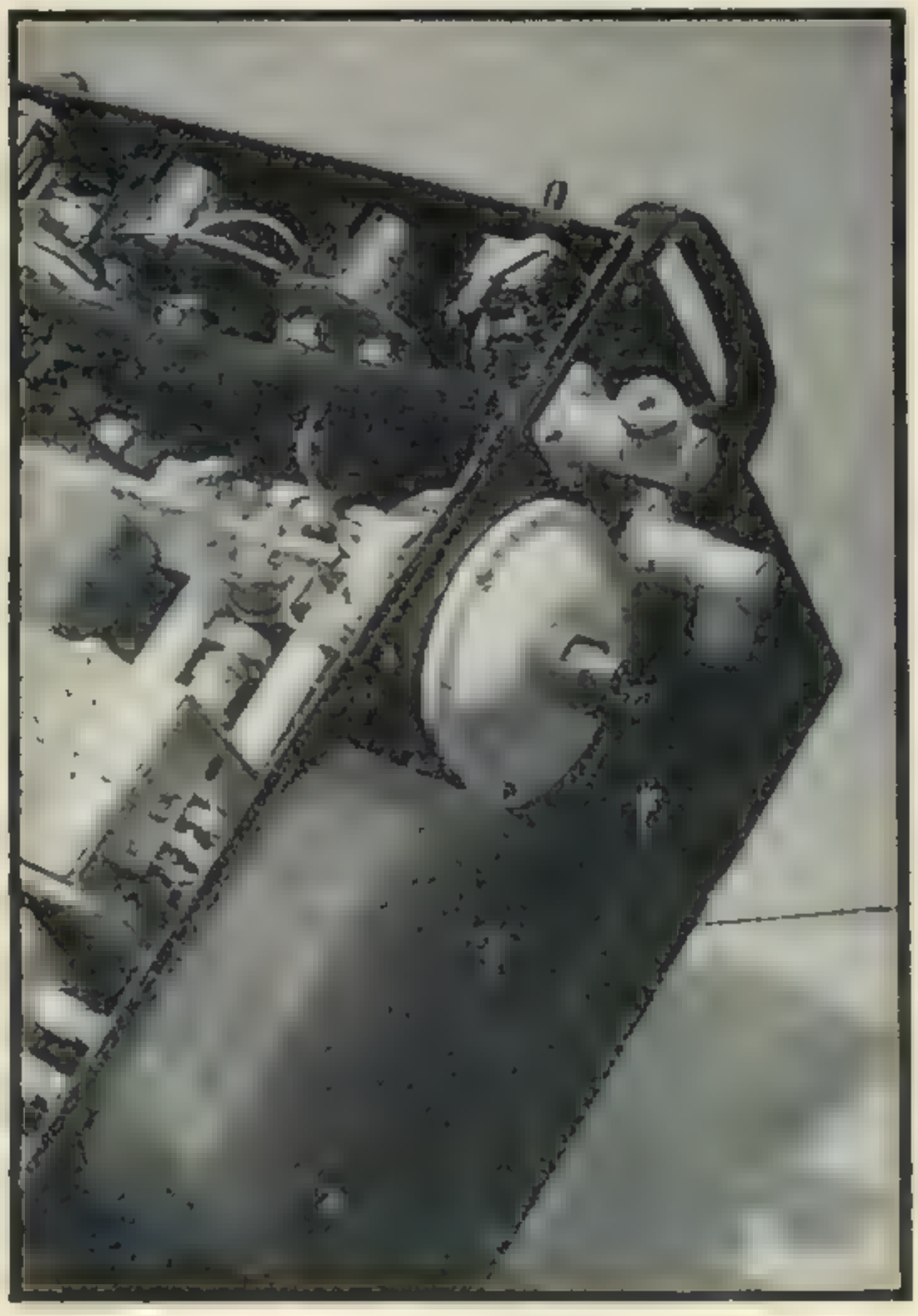
On the 15-meter band, set *A* to position 11 and *B* to the approximate center of this band. Adjust *C115E* for maximum and then recheck *C111E* also for maximum grid current. In the 10-meter or 11-meter band set control *A* to position 12

and *B* to a frequency that will multiply to about 28.5 mc (2375 kc for example). Adjust *C115F* for maximum and then recheck *C111F*. It may be necessary to check the frequency with an absorption wavemeter, since the range of *C115F* is sufficient to make the second multiplier operate as a doubler in place of the usual tripler—its normal function.

After-Thoughts

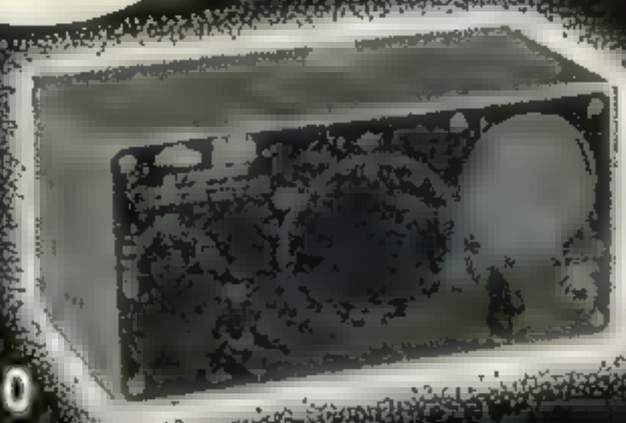
The audio response of the ART/13 may be improved by the removal of *C205* (.001 μf) in the speech amplifier. This will raise the high frequency response about 2 db at 6000 cycles. By substituting a .03 μf for *C202* (20μf) the response will be substantially flat to about 10,000 cycles. *C205* need not be removed from the unit, since it is only necessary to clip off the lead on the plate side. Similarly, *C202* need not be removed from the unit.

Certain models of the ART/13 require an improved grounding of the 813 to prevent parasitic oscillation. This is accomplished by removing the 813 and the panel cover over the tube socket. It will be noted that three socket contacts are joined by a jumper and are soldered together. To connect these to the chassis ground, solder another short length of wire to them and tie the



End view, showing low frequency and high frequency antenna connections.

SILVER



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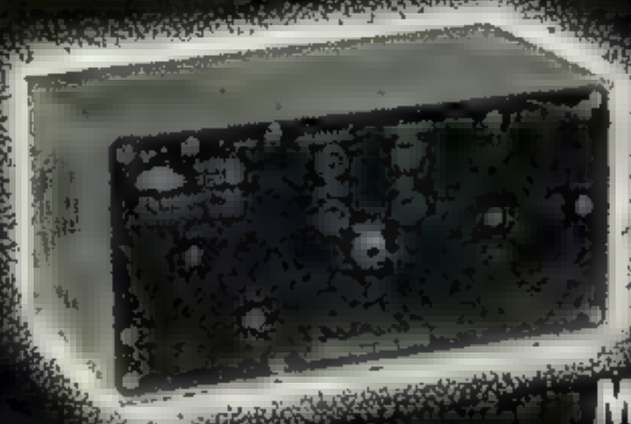

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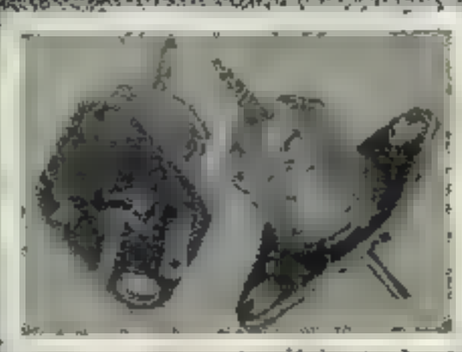

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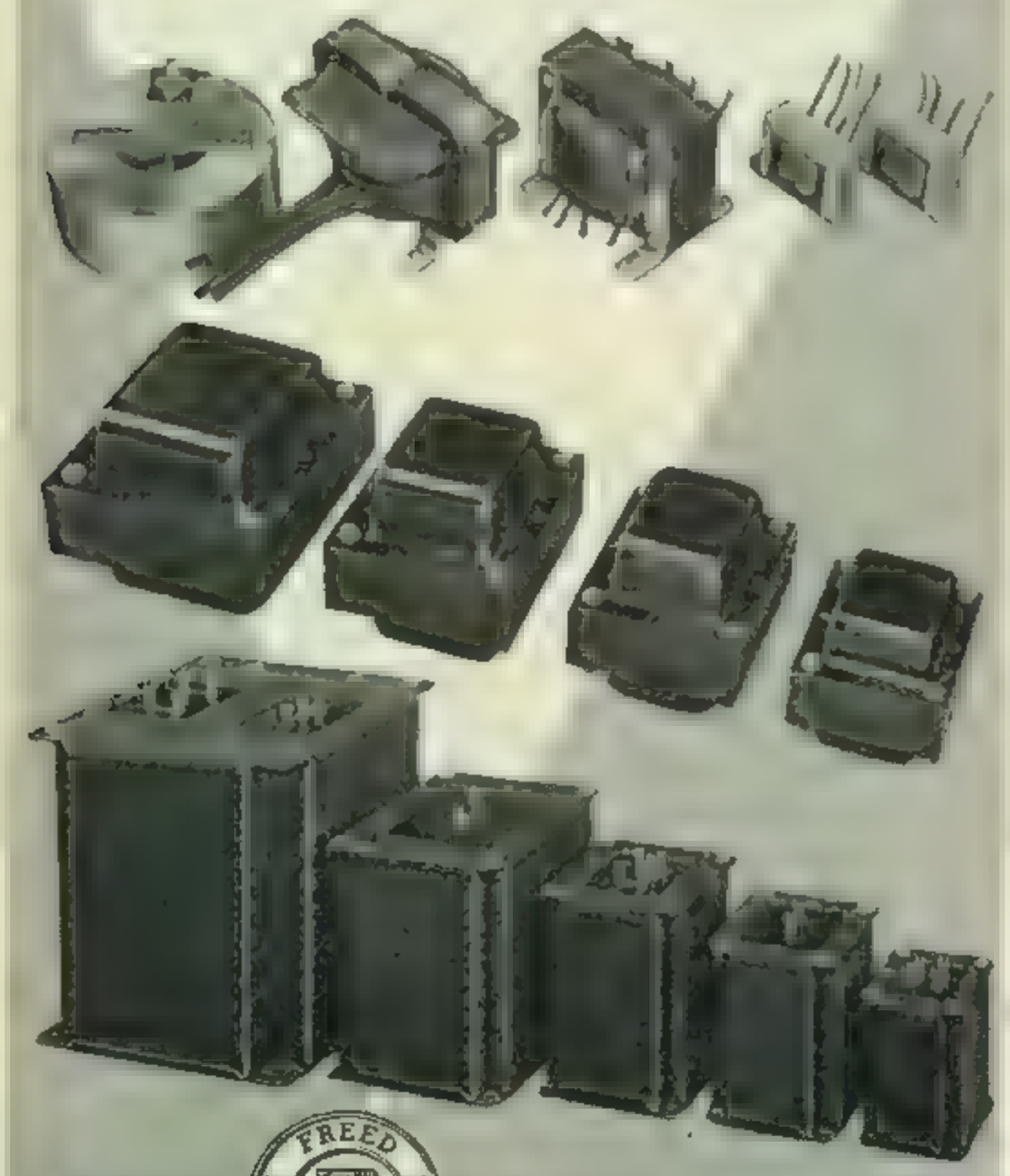

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the free end under the hexagonal support post. Remove the bottom post screw, clean away paint and re-install.

There is some confusion about the various readings of the *Plate* meter. In the position labeled *Battery Voltage* the meter reads 54 volts full scale. In the *P. A. Grid* position it reads 17 ma full scale. In the *P. A. Plate* position it reads 300 ma. In the latter position each major division on the arbitrary scale is equal to 30 ma. The current reading here is taken by reading the voltage drop across a 13.4-ohm resistor. In the second position a voltage drop across *R111* of 235 ohms is read. Half scale in this position corresponds to 8.5 ma. Tuning readings of the final plate current should always be taken in the *CW* position. If the plate current readings are taken in the *Voice* position they will include the static modulator current of about 40 ma.

LETTERS

[*from page 6*]

There are other cases of illeg l operation pendin ', but these two cases will serve as examples to show that it is both foolish and expensive, in addition to being convicted of a felony, to attempt to operate a station illegally in this country. When convicted by the Court of violating the Communications Act, both the amateur's operator and station licenses are revoked by the Commission. With the advent of television and frequency modulation, it is necessary for the Commission to monitor all types of communication, so that the various channels may be kept clear of interference. In cases where amateur operators operate out of band unintentionally, the Commission notifies them to recheck their equipment to definitely ascertain that they are in the proper band and that they are not emitting spurious emissions. This is done to keep service adjacent to the amateur frequencies clear of interference. In some cases, it has been found that the persons have been operating illegally in the amateur band on fone. Examination of these people have always disclosed that they are unable to pass a thirteen word per minute code test, which is required by all legitimate amateurs, whether they operate c.w. or fone. The Commission is well aware of the benefits to radio engineering and communication engineering derived from amateur operation and encourages any persons interested in radio communication to further their interest by actually operating in the amateur bands. It is only necessary that the persons who desire to become amateurs acquaint themselves with the communication laws and qualify technically to operate these stations. It is also felt that amateurs owe it to themselves, as an organization, to discourage any illegal or clandestine operation, since most of these operations cause considerable interference to other types of service and this is a reflection on the amateurs as a whole, unless it is definitely established that the person causing the interference is not a legitimate amateur. By assigning call letters and having the amateur's address available, it is possible to locate the amateur immediately if he unknowingly causes interference to other types of service, such as aviation, airlines, etc. In a case of a "bootlegger" appropriating an amateur call, it is necessary that the Commission use direction finding methods in order to actually locate the offender. In such cases, in addition to having their equipment confiscated, and in some cases the equipment costs a considerable sum of money, the persons illegally operating are subject to a fine, imprisonment, or both, depending upon the seriousness of the offense.

During the war, the Radio Intelligence Division, which is now combined with the Field Engineering and Monitoring Division, was charged with locating and apprehending any clandestine or subversive radio activity. Through this experience, the Radio Intelligence Division had built up an efficient organization which the Commission feels can cope with all illegal or unauthorized communications. Throughout the war, it was realized by all how important communications are and also the importance of keeping communication channels clear, in addition to locating and suppressing any subversive or clandestine radio communications. For this reason, it is believed that most United States Court Judges take the attitude that violations of Sections 301, 303 and 318 of the Communications Act of 1934, as amended, are a serious offense, as exhibited in the sentencing of the two cases described.

Arthur Batcheller, Engineer in Charge.

RELAY RACK

[*from page 28*]

Each side panel was cut from a single large piece of .040″ sheet stock. From each large piece we had enough remaining to make one of the two rear doors we planned on installing. Side panels need not necessarily be one piece, however. Two or more pieces may be used satisfactorily and may even be an added convenience.

The side panels are cut to come exactly flush with the four edges of each side of the structure, and are fastened with 8-32 screws tapped into the four pieces of angle which now form the sides. Screws about 10″ or 12″ apart are satisfactory.

The doors represent a more difficult installation problem. In order to give them something to rest firmly against when closed, a piece of the .040″ material was cut in a long strip, placed on the inside of the right rear vertical member, and riveted in place so that it extended about ½″ into the door opening. This forms a jamb for the door to close against.

About half way up the rack, a piece of the 1″ angle material was bolted horizontally across the rack. The top edge of the bottom door and the bottom edge of the top door rest against it. It, too, is bolted to the inner side of each vertical member.

The two doors were now cut to size. It was found that they were not satisfactory because they had a tendency to bend and spring back and forth. To counteract this, stiffeners were installed.

The stiffeners consisted of angle measuring about ½″ on a side. Pieces were riveted to each door in a rectangular shape, each piece lying parallel to and about two inches from each edge. We used small countersunk rivets. Flathead rivets are easier to install but don't look as well. If countersunk rivets are used, care must be taken to have each countersink exactly the right depth. If too shallow, the rivet head will protrude; if too deep, the rivet will not set properly, and will be loose.

Rivets are easily set by placing the head against a piece of steel rail or on a v'se, and using a flat punch and hammer to turn the upset head. Any rivets whic fail to set properly may be peened down with a ball-peen hammer. If this does no work, drill out the rivet and try again.

When doors are ready for installation, aircraft "piano hinge" may be used the full length of the rack, or in shorter lengths to accommodate each door. If it is necessary to cut the hinge, beware. A hacksaw goes through the aluminum hinge portion nicely but loses its teeth on the hard steel pin. A better method is to cut out a bit of the hinge material and use a file on the pin. Hinges

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may be riveted to the doors, and fastened to the vertical member with 8-32 machine screws. We installed catches with handles to facilitate opening the doors, and to make sure that they stay closed.

If desired, interlock switches may be added. These may often be obtained from surplus outlets in the form of aircraft micro-switches with actuator arms. They may be mounted so that the actuator arm bears against a closed door to close the switch.

Some Refinements

If the builder wishes to mount chassis to panels by means of brackets, the rack is now complete. We are inclined to think that this is rather the more desirable method. If considerable weight is involved, slides will distribute the weight more equally about the structure. These may be made from angle stock or from T section. We used T section because it may be fastened to side members in such a way as to distribute the strain on the mounting screws somewhat better than angle.

In any case, the portion of the slide upon which the chassis rests must extend into the rack interior far enough to make the inside measurement between slides less than 17". It is even more satisfactory if the extension is great enough so that no chassis, no matter how it may be slid from side to side on the slides, can ever fall off one edge. To do this, each slide must have a chassis panel bearing surface equal to or slighter greater than the difference between the chassis length and the inside width of the rack.

When installing slides, bear in mind that the bottom edge of each panel, hence of each chassis, falls midway between two holes ½" apart. Select the holes between which the slide is to mount, and carefully measure and mark the mid-point. Clamp the slide to the side members of the rack at this point, then use the steel tape to be sure the rear end of the slide is at exactly the same height as the front end. Then clamp the rear end and drill for mounting screws. If T section is used, place one screw above the stem of the T and one below, thus distributing the strain. Screws go through both side panels and side members.

Installation of some slides may prevent one or the other of the rear doors from closing because the stiffener angles hit the slides before the door is completely closed. To cure this, file or hacksaw a notch in the slide to clear the stiffener.

Since a loaded rack is notoriously hard to move, we had a friend put together a dolly with castor wheels. This was made of 1" steel angle, with the corners cut on an angle and welded. The metal plates of the castors were in turn welded to the bottom of the dolly. The inside dimensions of the dolly should be such as to clear the rack about ¼" all around.

Afterthoughts

To paint the rack remove doors and side panels. The rack structure is left assembled and given a sprayed coat of primer, preferably zinc chromate. Then spray on a couple of coats of telephone black lacquer or similar paint. The side panels and doors get the same treatment. The piece of channel at the top and bottom of the front can be masked off and buffed, then given a coat of clear lacquer. The panels are the same color as the rack.

The lower door probably should be redesigned so that it does not come completely to the bottom of the rack. It should end about 3″ above the bottom so that one has access to sockets, terminals, etc., on the power supply chassis at the bottom of the rack.

The bottom and top of the rack may be covered with some sort of screen or perforated material to allow ventilation and still exclude a certain amount of dust. It would be nice to have louvres in the side panels, but we couldn't figure out an easy way of making them. The rack at present houses a 125 watt 'phone transmitter, but we figure that, with proper placement of the several chassis, we could up the power to a half kw and still stay within bounds.

All of the foregoing is representative of just one design. It is indicative of what can be done with the materials at hand. We have seen other designs just as good or maybe better. We saw one beautiful job made of aluminum and wood. Another consists of an aluminum dolly arrangement to which have been mounted two pieces of T section braced at the top. It is six feet high and looks like it can support a lot of weight. Still another builder plans to disassemble his rack, buff it up and have all parts anodized for a beautiful dull finish.

FOR SALE

[*from page 30*]

and am doing all right except that there's lots of good stuff I can't manage to hook. There's a VS4 that I hear a lot and a YR, not to mention a ZS6 that I wouldn't mind working, but no luck. I can work routine stuff but the really elusive boys are not for me.

Then one night while I am happily piling up foreign contacts it happens. There is a king-size, snarling roar that nearly lifts the cans off my head and for an unhappy moment I think I am part of an atom bomb experiment. Of course it is no such trivial thing. It is Alf Gusher. His call and ticket have arrived and he is giving practical evidence of same. To make matters worse he is calling a CE1 that I have been trying to hook for days. For the moment my befuddled brain

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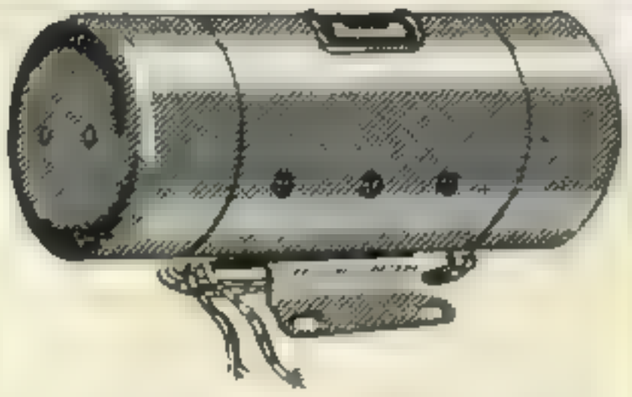

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does not even record the strangeness of Gusher hearing a Chilean on his little blooper. I just sag in my chair like a guy who's been slugged with a beer bottle and remain until Gusher stands by

Why this has to happen to someone who has always tried to live right is what I am trying to figure out when I am suddenly aware of goose pimples spreading up my neck. They are caused by the fact that this CE1 is coming back to Gusher. I shake all over and have a hard time keeping the cans on my head. But it's happening and I am hearing it with my own ears. I listen for a signal report and in a moment or two I hear Gusher getting RST 574. The four, of course, is somewhat of an exaggeration because Gusher's own mother wouldn't go higher than two. But that is neither here nor there. It is the least important part of this tragic event.

It hurts even to think about what happens from then on. All evening Gusher knocks off DX with great ease. He works just about everything he calls and on the one or two CQ's he tries he raises a couple of G's and an SM. I figure I should congratulate him but the way I feel I think maybe it is better if I just go to bed and try to forget.

Gusher seems to have the ham bug all right. He is on the air every night for the rest of the week and it's just like that first night. He seems to hear almost everything that I do but the difference is that it seems to hear him. A month goes by and I am scared to think of how many countries he's worked. Anyway, it is much simpler just to think of the ones he hasn't worked. Then it occurs to me that I am not even sure of these because he is likely on the air in the daytime when I am attending to the affairs of the Corn Waffles Company. Therefore I decide to go and see him and find out what the score is. I might as well learn the gruesome facts and I am also figuring that maybe the guy who sold him the copper tubing and the 203A might have some more.

Accordingly I enter the Gusher residence and he promptly greets me with a stack of foreign QSL's. "Look 'em over," he says. "They've just started to come in."

I lower myself into a convenient chair and thumb through them. I'm the guy who should be stamp collecting, I'm beginning to think, and seeing the endless varieties stuck on the fronts of Gusher's swell QSL's I am unable to refrain from telling him so.

"I guess I'm getting too old for hamming," I tell him sadly. "I don't think it agrees with me any more. It's too exciting. I need something quiet and reserved."

"Ham radio takes up a lot of time and energy," agrees Gusher brightly. "The way those foreign stations keep calling you. You no sooner finish

with one than another calls you. It sure is awful."

"It sure is," I tell him.

"And then other nights," goes on Gusher, "conditions are terrible and you only work about 20 stations."

I roll my eyes slightly.

"I guess," he says, "after a fellow has been in the game as long as you have he gets used to that sort of thing."

"You can get used to anything," I tell him, ". . . almost anything, Gusher."

A week goes by and things are just about the same. Then one night I turn on the receiver and a strange thing happens. At first I think the set has gone dead or that maybe I am deaf. Then I realize it is only that Gusher is not on the air. I figure maybe he is standing by but an hour passes and still no Gusher and I am so elated that I almost put the rig on the air. Next night it is just the same, no signs of Gusher and the first thing I know a week has gone by without a single bit of keyed hash coming from next door.

At first I am very happy because I think he has unwisely come in contact with his power supply and then an awful thought seizes me. It might be that he is working on some new rig, something bigger and better, say a half-kilowatt quenched spark, and when this thought comes to me I am unable to hold off any longer and I make rapid tracks for the Gusher mansion.

What I see cannot be believed. There is Alf Gusher seated in his kitchen sticking stamps into an album. Beside him he has a stack of hinges and a bunch of foreign stamps taken from QSL's.

"I got thinking about what you said the other night," Gusher says, "About stamp collecting I mean. So that's what I'm doing now."

My brain whirls but I manage to ask him if he's going to use DX-ing to garner foreign stamps.

"Heck, no," says Gusher impatiently. "It's too slow. Like I told you before, you only work 20 foreigners in a whole night sometimes. For a dime you can buy a big package of stamps."

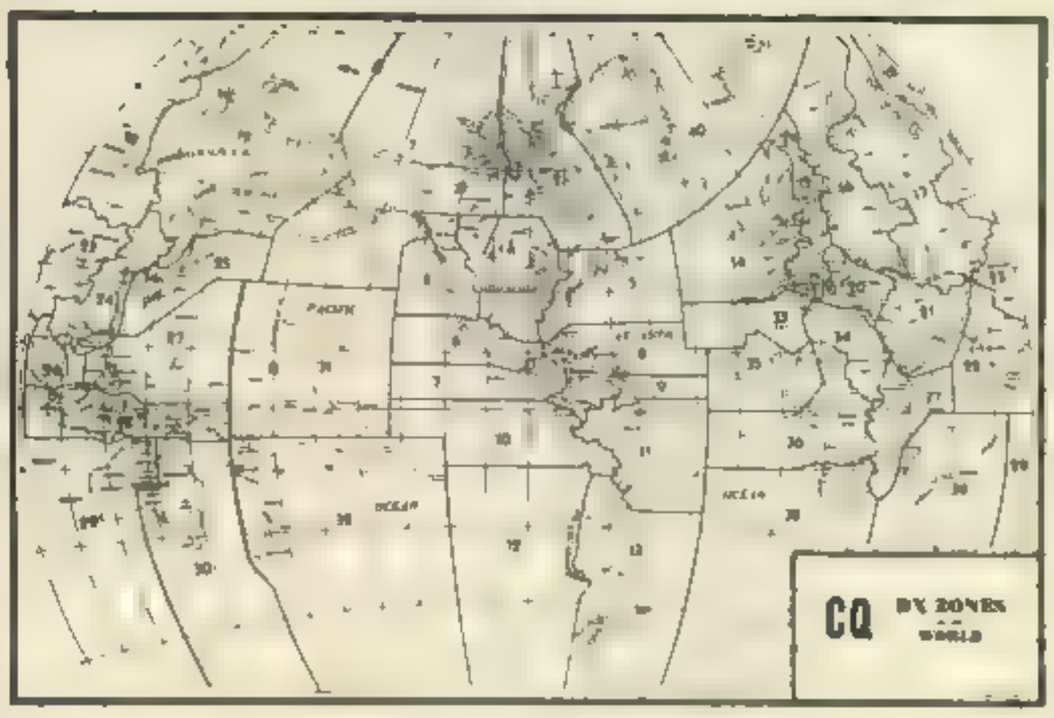
Firmly grasping the corner of the table I manage to remain upright. Fresh thoughts seize me. Much as I love my 813s, the classy rack-and-panel construction and the smooth lines of my communications receiver I can hardly ignore what has been going on, so trying not to sound too eager I fix Gusher with a friendly smile and suggest that the sell me his station.

"You won't be needing the stuff, old man," I purr at him, "and I might be able to use the odd parts for repairs."

Gusher licks a stamp hinge then shakes his head. "Can't do it," he says. "You're too late."

"What do you mean?" I want to know.

"Tore it all down," says Gusher. "Every last



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bit of it and I sold most of the parts to the guy I bought them off."

I drop into a chair and sit there looking at him while he puts a whole row of stamps into his album. I refrain from socking him or otherwise behaving unwisely. I suppose a guy can sell his own rig, there's no law against it. After a while I get up and say, "Good night, Gusher," and turn to go.

Gusher looks up. "Sorry you can't stick around. Lots of fun, this stamp business."

I just gulp.

"I hear there's a Cypress stamp with two heads on it," goes on Gusher. "It's worth a thousand dollars."

"You'll probably find it in some ten-cent packet," I tell him. "In fact, I'm sure you will," and with that I go home and start working W9s.

CONDENSER BY-PASSING

[*from page 24*]

problems may be solved with the accompanying chart. Since the physical size of the chassis and part arrangement will predetermine the length of the condenser leads, it is only necessary to employ the largest condenser value indicated. For example, to effectively by-pass 145 mc with a standard size postage stamp type mica condenser having a lead length of 1.25 inches the best capacity would be approximately 40 $\mu\mu$f.

ANTENNA COAX

[*from page 21*]

as the permanent feeder.) The velocity constant of RG- /U cables is approximately 0.66. By multiplying the length of an air dielectric eighth wave line (velocity constant 1.0) by 0.66 the length of the electrical eighth wave referred to above can be obtained. A thermocouple am-

TABLE 2

DB LOSS VS. % POWER LOSS

DB Loss	% Power Loss
0.0	0.0
0.5	10.6
1.0	20.6
1.5	29.1
2.0	36.7
2.5	43.8
3.0	50.0
3.5	55.4
4.0	60.2
4.5	64.6
5.0	68.4
5.5	71.9
6.0	74.9
6.5	77.9

meter should be used to check the center conductor current at the transmitter and at the junction of the permanent and temporary lines. By varying the x dimension, the standing wave ratio along the line can be adjusted to apprach unity. This will be indicated by identical current readings at two points on the transmission line a eighth wavelength apart. After the tests are concluded and the optimum x dimension has been found, the temporary line may be removed without upsetting the performance of the system. An additional eighth wave length should be added as a double check.

Another possible application of the RG- /U cables is shown in *Fig. 7*. In this application coaxial cable is used to link-couple the final tank to the end of an antenna whose length is any number of half wavelengths. This arrangement provides a convenient method of feeding a long wire antenna in which the close end of the antenna is secured near the attic window of the shack. The parallel resonant circuit can be located in a weatherproof box within arm's length of the window so that the variable condenser, C, can be adjusted with the antenna in its normal position.

Other Applications

Short lengths of flexible coax can be used conveniently to feed many types of mobile antennas. Flexible links between a v.f.o. and the transmitter and between the succeeding stages of the transmitter can be made up from the smallest of these cables, such as RG-59/U.

Other possible applications of flexible coax will no doubt be apparent to the reader. As more of the cable is made available and as suitable techniques are developed this type of transmission line will no doubt enjoy increasing popularity with the ham fraternity.

TABLE 3

POWER RATING IN WATTS VS. FREQUENCY IN MEGACYCLES

Type	20mc & below	30	50	120	240
RG-8/U	2600	2000	1400	760	475
RG-11/U	1800	1400	1000	560	350
RG-34/U	4500	3400	2400	1200	760
RG-59/U	860	680	500	275	180

Based on center conductor temperature of 175°F. and ambient temperature of 140°F.
(Courtesy of American Phenolic Co.).

Since the preparation of this article several coax connectors have been commercially produced. These connectors are for the specific purpose of connecting coax cable to a dipole and include the B & W Coax Connector and the James Knight Impedacoupler.

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HR 317. Six volts at 2.5 amps. *YOUR COST ONLY 89c.*

LEACH RELAY—TYPE 1177CPS
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CRYSTAL GRINDING KIT—including 4 "BT" blanks; state preference in 5.4 to 8.4 megacycle range; 2 holders, abrasive, instructions, treatise, $1.00. Breon Laboratories, Williamsport, Pa.

FOR SALE: New Hallicrafters SX28A—$200.00. Hugh Pierce, Jr., Stratton Road, New Rochelle, N. Y.

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1-0-1 ma. milliammeter, round, 2⅜" diameter, $2.00. 3" cathode ray scope, radar indicator ID-93/APG-13A, 115v 400cps, compact, complete with 11 tubes, new, $25.00. Send for list, Rubin Radio, Shrewsbury, N. J.

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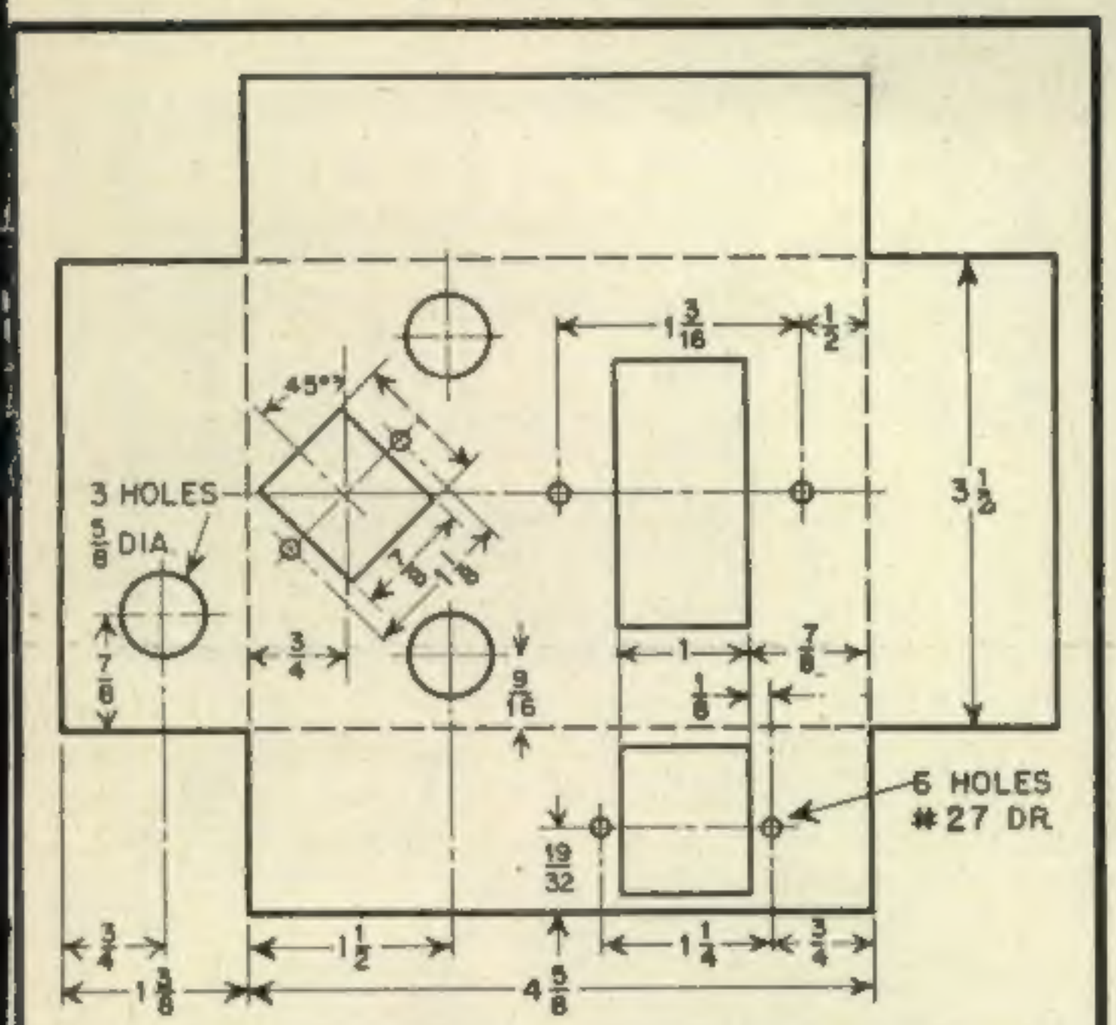
COMPACT MODULATOR

[*from page 18*]



Mechanical layout and dimensions of 10-watt mobile modulator.

In *Fig. 4* a proposed circuit is outlined for the higher power modulator. This circuit uses a 2E30 speech amplifier to drive a pair of 2E30s with a single-button carbon microphone. A transformer is not necessary for the microphone, because the sensitivity of the speech amplifier is sufficient to deliver adequate signal voltage to the grids of the push-pull modulator stage. An alternative microphone could be a high output crystal microphone, as is indicated in the diagram, and should work equally well. As in the case of the class AB1 modulator, this AB2 modulator can also be used with a.c. or d.c. Typical operating data for the class AB2 2E30s are as follows:

Plate and screen potential	250 volts
Grid potential	–30 volts
Plate current, no signal	40 ma
Plate current, max. signal	120 ma
Screen current, no signal	4 ma
Screen current, max. signal	20 ma
Plate-to-plate load	3800 ohms
Percentage of distortion	4%
Approximate power output	17 watts

Either of these two mobile modulators makes a compact, efficient unit for your mobile transmitter. They will save you many hours of battery life, and permit you to keep your mobile rig more constantly on the air.

In conclusion, may we suggest an excellent mobile 2-meter station? One of the surplus U. S. Signal Corps 6/12 volt, 500 v. @ 160 ma genemotors converted to 250-volt output as outlined in a recent National Co. advertisement, a Hytron HY-Q 75 oscillator, and the class AB1 modulator described in this article will give you an excellent push-to-talk 2-meter mobile rig.

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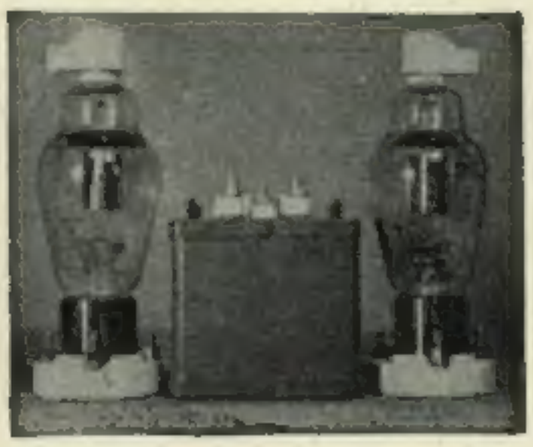

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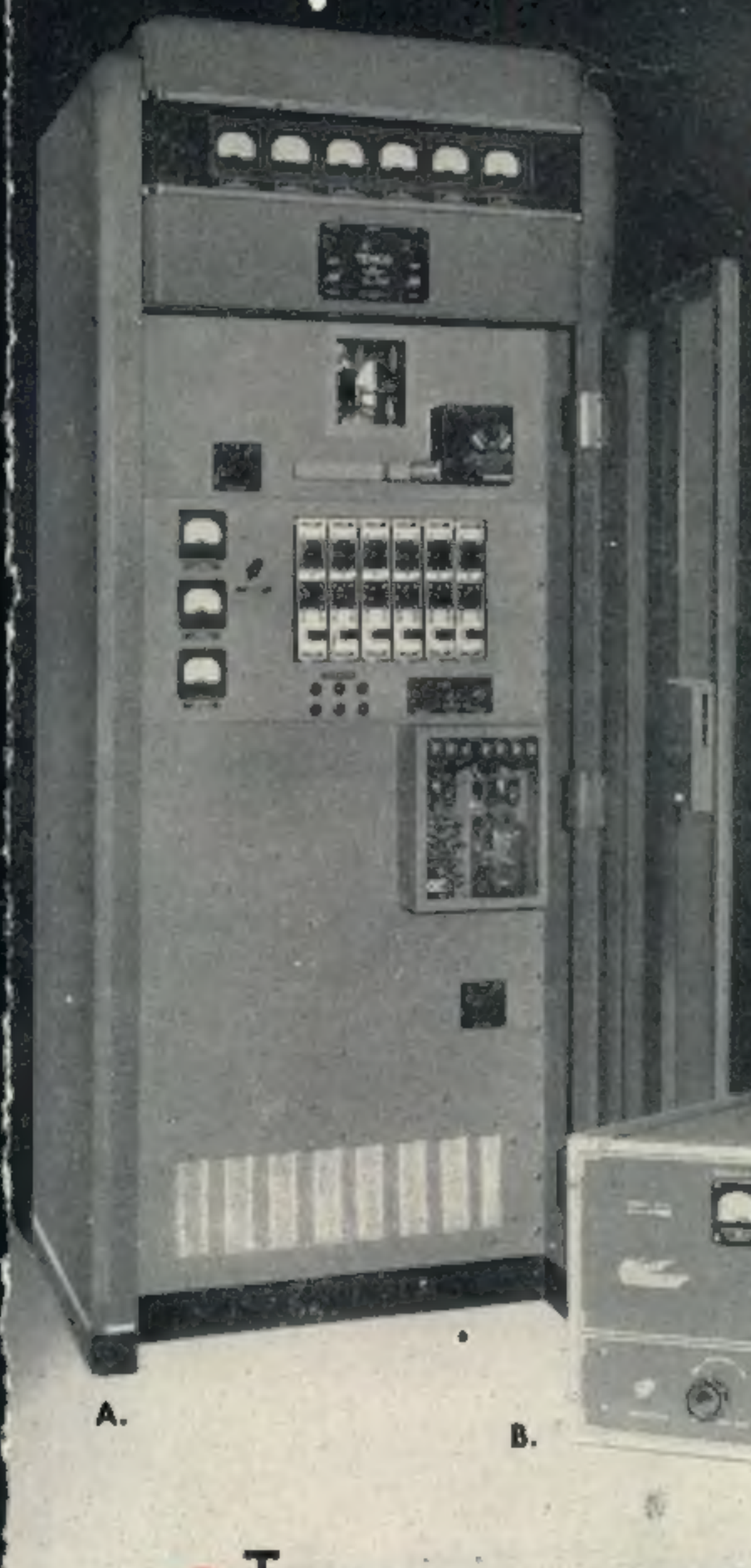

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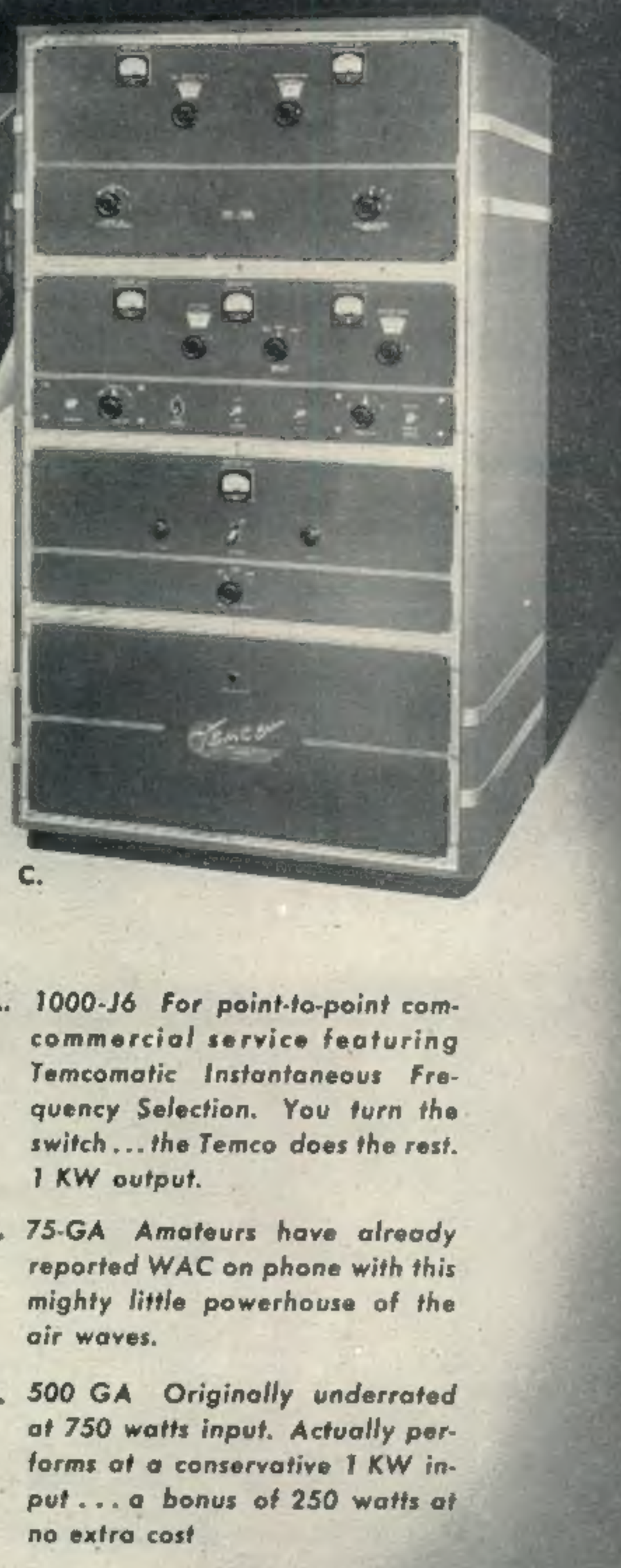

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